CONTRIBUTIONS TO THE ROYAL AIR FORCE AIR POWER REVIEW

The Royal Air Force *Air Power Review* is published quarterly under the auspices of the Director of Defence Studies (RAF) and has the sponsorship of the Assistant Chief of the Air Staff. It is intended to provide an open forum for study which stimulates discussion and thought on air power in its broadest context. This publication is also intended to support the British armed forces in general and the Royal Air Force in particular with respect to the development and application of air power.

Contributions from both Service and civilian authors are sought which will contribute to existing knowledge and understanding of the subject. Any topic will be considered by the Air Power Review Management Board and a payment of £200 will be made for each article published.

Articles should be original and preferably not previously published, although those of sufficient merit will not be precluded. Between 2,000 and 10,000 words in length, articles should list bibliographical references as end notes, and state a word count. Lengthy articles may be published in instalments. Contributions from serving military personnel should be in accordance with DCI GEN 313 dated 26 November 1999.

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FOREWORD

This Autumn edition of *Air Power Review* opens with a historical piece from Dr Alfred Price, 'Mischief Night', which describes the allied radar spoofing operations that took place during the hours of darkness of the 5/6 June 1944: an essential part of the Operation OVERLORD plan. Although the general outline of the operations is fairly well known, this article describes in considerable detail the range of activities taken both to protect friendly surface and air forces operating in the Normandy area, as well as delaying the movement of enemy reserve forces by convincing enemy commanders that the main body of the invasion was in the Pas de Calais area. In terms of lessons for today it is interesting to consider whether such operational level deception could still be achieved, given the level of media access and involvement in modern operations.

An area for much debate and frequently strong opinions, is that of ballistic missile defence (BMD), and Dr Jeremy Stocker's item on Britain's policy on BMD provides a useful introduction to the subject area. It traces the development of our policy from the 1940s, remembering that Britain was the first country in the world to come under effective ballistic missile attack, through to the current and perhaps paradoxical situation where although the UK has no plans to acquire any form of BMD, it is actively involved with the US in developing American defences and hosts two essential elements of US BMD. The requirement for any homeland-defence system to be integrated within a Europe-wide context is clearly brought out, and of course applies equally to dealing with non-BMD threats — think of 9/11 in a European scenario – how many countries' airspace would the aircraft have flown through before reaching their eventual targets? The author's conclusion regarding what it will take to produce a considerable change in policy is, whilst somewhat negative, probably true.

Whilst much has been written on the subject of Effects Based Operations (EBO), most of this has focussed on the RAF and USAF perspectives so Ryan Clow's piece provides an interesting perspective — that of a Canadian observer looking at the thinking of both the US and UK on the subject, and then considering the implications for the Canadian armed forces. The conclusion that EBO, if it is to be effective, requires the integration of all capabilities: kinetic and non-kinetic, military and civil, has considerable alignment with current UK concepts in this area. However, the trick lies in the ability of pan-governmental bodies to pull such an approach together — and this is a field where much more work will be needed.

A little known piece of air force history is covered by Wg Cdr Ellard in his article on the RAF's Servicing Commando Units (SCUs) from the Second World War. These units, made up of technicians who had volunteered for 'special duties' and subsequently completed commando training, were the result of considerable analysis by the RAF regarding its poor maintenance and logistics performance during the Battle of France in 1940. The SCUs' performance across a number of theatres resulted in considerable plaudits as well as a number of awards, although the Service's innate resistance to 'elite' units together with their limited utility outside the operational scenario for which they were designed meant that their lifespan was fairly short. The author then examines our current posture with regard to the same factors and concludes that there are lessons regarding the capability, although not necessarily the organisation, that we could usefully use today.

Wg Cdr Dean Andrew's piece on the culture of World War II Luftwaffe fighter aces is one that should generate a considerable degree of thought — and perhaps some questions — in the minds of those who read it. His analysis of the 'softer' aspects of the Luftwaffe's personnel management strategies certainly goes some way to explaining how their leading fighter pilots were both able and encouraged to rack up such tremendous scores, although the impact on those who were not amongst the 'Experten' perhaps needs

consideration in the interests of balance. It would also be interesting to consider whether the cultures of the RAF and USAF resulted in a noticeably different overall success rate.

The final article considers air-land co-operation in Normandy, and was produced by Commodore Moncrieff, a recent HCSC student. Whilst the fact that personality can have a tremendous impact on the conduct of military operations is not new, there can be no doubt that this particular case is an abject example of the effects that can result from poor C2 arrangements combined with personality clashes. The inability to apply lessons hard-won in other theatres of war should be a salutary reminder to us all of the need for robust internal communications, together with a healthy *joint* debate on how air-land co-operation can best be taken forwards. It is clear that Project CONINGHAM-KEYES will be instrumental in this regard, although the business of building trust between commanders will of course always be a very personal affair.

One last point — if you are a regular Air Power Review reader but have not filled in and returned the questionnaire that was contained in the last edition, it is not too late for you to do so. The journal is likely to be undergoing considerable change in the near future, and your feedback is essential if the Editorial Board is to continue to produce a product that meets the needs of both the Service and wider audiences. Please do take the time to let us know your thoughts.

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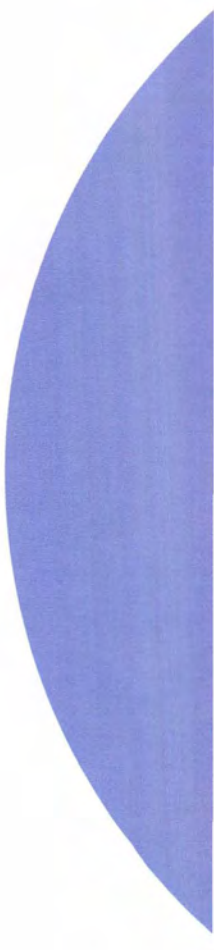

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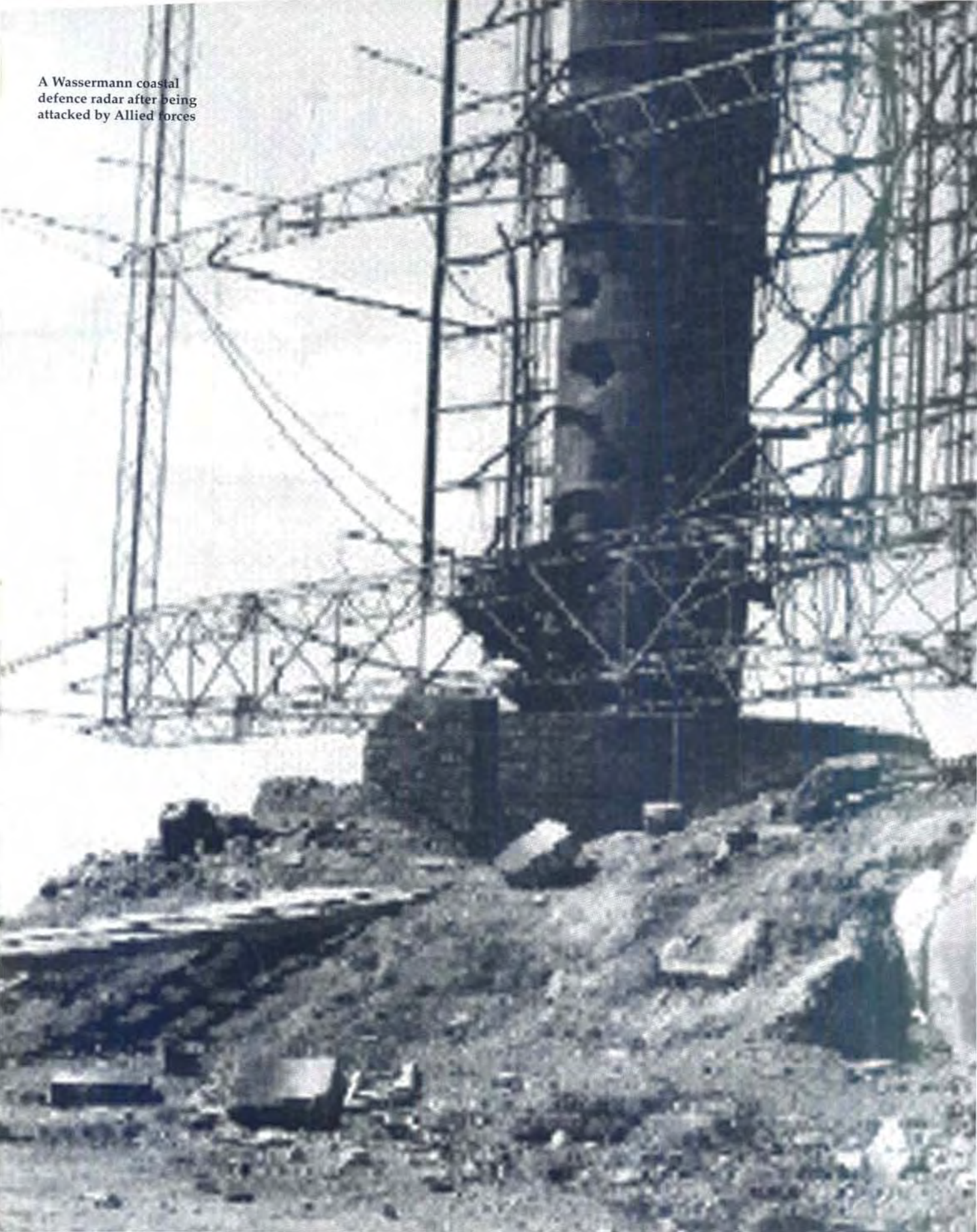
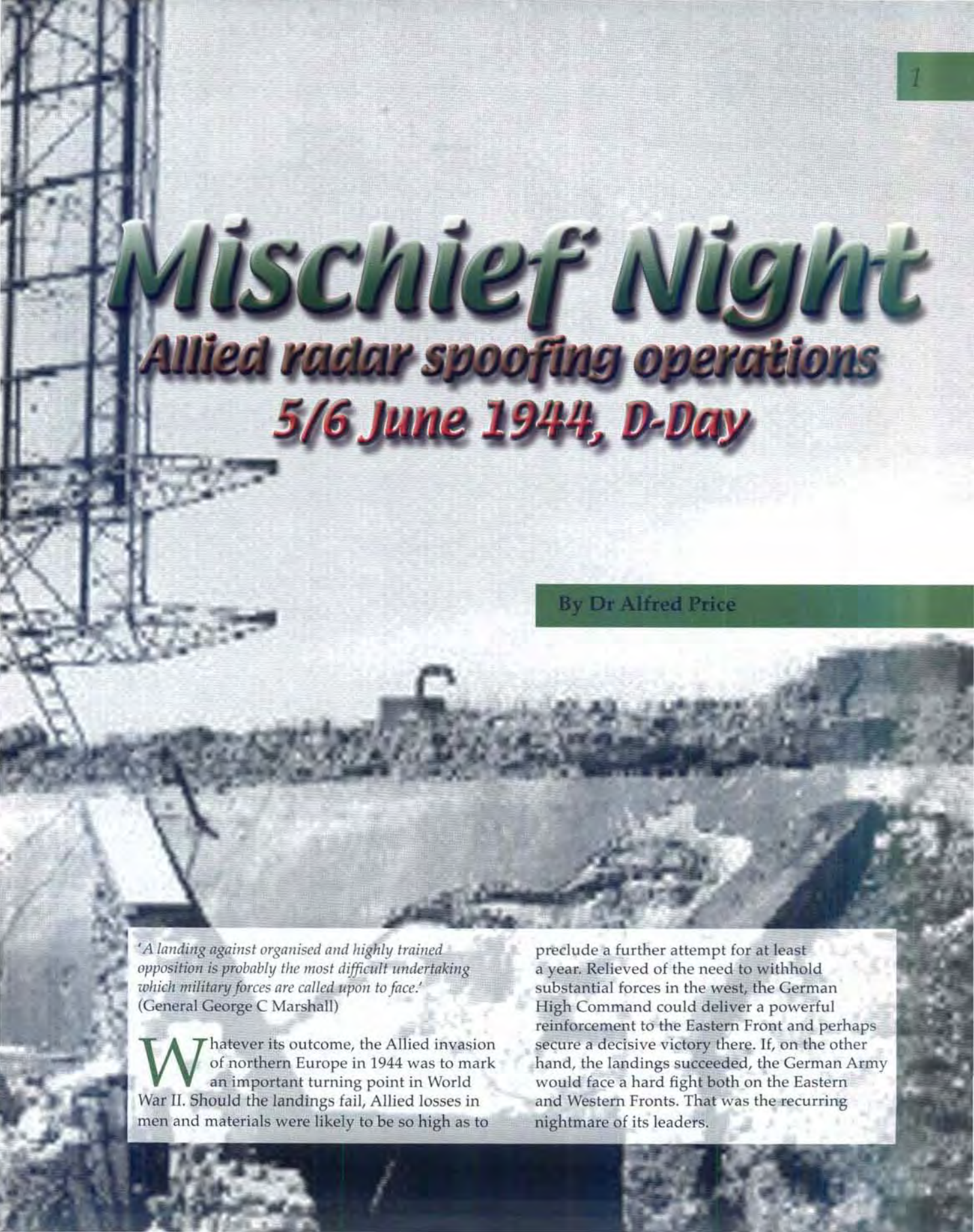


A Wassermann coastal defence radar after being attacked by Allied forces

Mischief Night

Allied radar spoofing operations 5/6 June 1944, D-Day

By Dr Alfred Price



'A landing against organised and highly trained opposition is probably the most difficult undertaking which military forces are called upon to face.'
(General George C Marshall)

Whatever its outcome, the Allied invasion of northern Europe in 1944 was to mark an important turning point in World War II. Should the landings fail, Allied losses in men and materials were likely to be so high as to preclude a further attempt for at least a year. Relieved of the need to withhold substantial forces in the west, the German High Command could deliver a powerful reinforcement to the Eastern Front and perhaps secure a decisive victory there. If, on the other hand, the landings succeeded, the German Army would face a hard fight both on the Eastern and Western Fronts. That was the recurring nightmare of its leaders.

Giant Wuerzburg German defence radar

By picking up and decoding the German radio reports of the aircraft tracks, and back-plotting the distances and bearings given by the radar stations, Allied intelligence officers located several stations

Detailed planning for the invasion, Operation OVERLORD, began late in 1943. Soon afterwards tentative discussions began on the possible use of radio countermeasures to support the operation. The first expert in this field to become involved was Dr (later Sir Robert) Cockburn, head of the countermeasures section at the Telecommunications Research Establishment at Malvern. Together with the US ABL-15 countermeasures team co-located with it at Malvern, he began work to prepare the countermeasures plan to support the invasion. As with most aspects of OVERLORD, there was close integration between the British and the American efforts at all levels.[1]

By the late spring of 1944 the Luftwaffe fighter force had been so depleted during the hard-fought battles over Germany itself that Allied air superiority over the landing area was assured. Nevertheless, it was vitally important that the remaining German land, sea and air forces be permitted few opportunities to engage the troops as they waded ashore during the initial stage of the landings. The plan for the countermeasures operation, supporting OVERLORD, had the following aims:[2]

■ To prevent the enemy obtaining early warning of, and accurate plots on, approaching surface forces.

Having located the radar stations, knocking them out was no easy task . . . The specialised task of destroying these targets was assigned to Spitfire and Typhoon squadrons of the mainly British 2nd Tactical Air Force

Four underwing rockets aboard an RAF Typhoon

■ To prevent enemy coastal batteries from using radar-controlled gunfire against surface forces.

■ To support airborne operations by:

1. Reducing and confusing the enemy's early warning system, thus delaying both the arrival of fighters amongst and alerting of the threatened dropping zones.

2. Interfering with enemy fighter control R/T, thus affecting both the movement of night fighters into the area of operations and the vectoring of intercepting fighters.

3. Producing diversionary threats and thereby dividing the enemy's available fighter effort.

■ To delay the movement of enemy reserve ground forces by producing threats of apparent assaults, both airborne and seaborne.

Destruction of the defenders' radar infrastructure

To reduce the difficulties of jamming and spoofing the German radar network along the Channel coast, the first priority was to destroy as many as possible of the ground installations. The target was formidable: as part of Hitler's West Wall, there were radar stations positioned at roughly 10 mile intervals along the coast from Ostend to Cherbourg, each with an average of three radars.[3] These stations were equipped with the menagerie of German ground radar systems: Freya, Mammut and Wassermann early warning radars, Seetakt ship search and fire control radars, Giant and small Wuerzburg radars for fighter and flak control.

It was important that the softening-up operations should give no hint of where the invasion was to take place. To that end, for each radar target attacked in the area of the intended invasion, at least two were to be attacked in areas outside it.

For their success, the air attacks on German radar targets would depend on the accuracy of intelligence information on their locations. By the spring of 1944, Dr R V Jones's Scientific Intelligence department at the Air Ministry had assembled a detailed picture of the German radar network. But this picture had to be updated continually since radar sets, particularly the mobile Freya and Wuerzburg equipments, could be moved quickly to a new site and be operational within a few hours of their arrival.[4]

To assist in plotting the radars, the Telecommunications Research Establishment produced a special ground direction finder code-named 'Ping Pong' able to determine the bearing of a radar transmitter to within a quarter of a degree. From widely separated points across the south of England, the three Ping Pong equipments took bearings on enemy radars along the north coast of France.[5] Triangulation of the bearings gave approximate positions of the stations, which were then refined by photographic reconnaissance of the area.

Further help in locating German radars came from decoding radio reports on the movements of Allied aircraft, broadcast by the stations. As part of a long running operation code-named OCCULIST, Allied reconnaissance aircraft made carefully planned flights over occupied Europe, photographing the ground beneath to provide an accurate record of their tracks. By picking up and decoding the German radio reports of the aircraft tracks, and back-plotting the distances and bearings given by the radar stations, Allied intelligence officers located several stations.[6]

Having located the radar stations, knocking them out was no easy task. These small pinpoint targets were usually well protected by 20 mm and 37 mm anti-aircraft guns. The specialised task of destroying these targets was assigned to Spitfire and Typhoon squadrons of the mainly British 2nd Tactical Air Force. The anti-radar operations began on the morning of 16 March 1944,[7] when 12 Typhoons of No 198 Squadron set about the Wassermann early warning radar station near Ostend on the Belgian coast. During the initial attack four Typhoons attacked the radar with rockets and cannon, while the other eight strafed flak emplacements surrounding the main target. As the fighter-bombers left the target the 130-foot high antenna tower remained upright, so that afternoon the fighter-bombers returned. More

rockets hit the structure, but though battered the tower remained standing. At first it seemed that the radar had survived the attack, but that was not the case, for the Achilles heel of the Wassermann lay in the mechanism to rotate the aerial. The aerial was attached to a rotating sleeve, which turned on a fixed vertical cylinder. The rocket damage to the sleeve prevented it from rotating, and the aerial array could be lowered to the ground only if it faced in a certain direction. With the aerial tower now rigidly locked in the vertical position, German engineers had to dismantle the entire structure before they could commence repair work. The Ostend Wassermann would still be off the air in the following June when the invasion began.[8] Other types of radar suffered similar difficulties after being attacked from the air.

Meeting potential threats

By this stage of the war the Allied intelligence services were gaining such a wealth of information from decrypted enemy ground-to-ground transmissions that communications jamming was permitted only in exceptional circumstances. Yet there was a need to have such a capability, in case the land battle entered a critical phase and such jamming might swing the balance. During 1943, the US Radio Research Laboratory (RRL) at Harvard designed and built a range of communications jammers to cover the frequencies used by the German aircraft and tank radios. Two of these jammers, the airborne ART-3 Jackal and the ground MRT-1, went into limited production. The former proved all too effective during tests at Wright Field, Ohio, however. The officer in charge of the test, Lieutenant Colonel George Haller, recalled:

'During the lead up to the invasion we conducted tests with a new type of communications jammer, the ART-3 Jackal, a frequency modulated device to jam the German tank communications on the 27 to 33 MHz band. What we did not realise, however, was that the radios used by some Ohio police departments were using the same frequency as the German Panzers. One afternoon during a test of our airborne jamming of these tank frequencies to determine its effectiveness, there was a serious bank robbery in one of the small towns near our base. The robbers were able to make their escape due to our jamming of the police radios. The FBI soon figured out what the problem was and our laboratory was subjected to an investigation to see if there was any connection between us and the robbers. Fortunately we were found to be clean.'[9]

The MRT-1, code-named 'Elephant Cigar' and produced by the RRL, was by far the most powerful communications jammer built during World War II. It covered frequencies in the 38 to 52 MHz band, and radiated 50 kW from a large directional aerial mounted on a 105-foot high tower.[10] The jammer arrived in England in March 1944 and Royal Air Force technicians assembled it at a site near Brighton. Technicians completed the assembly of the transmitter components during May 1944, but completion of the aerial array had to wait until the invasion began. The directional aerial needed to point towards Normandy, and had a German reconnaissance aircraft photographed the structure beforehand this might have betrayed the planned invasion area.[11]

To cover the flanks of the seaborne invasion, British and US airborne troops were to carry out a large-scale parachute and glider assault at night. The leading aircraft were to drop pathfinder teams, who would erect 'Eureka' radar transponder beacons to assist follow-up transport aircraft to locate the dropping zones. If the Luftwaffe reacted swiftly and sent aircraft to jam or spoof the Eureka transponders that could seriously disrupt the airborne landings. To guard against this possibility, TRE engineers fitted four Mosquito night fighters with modified 'Lucero' air-to-air homing equipment to enable them to home on and destroy aircraft carrying such jammers.[12]

The ghost fleets

While the systematic destruction of the German radar network in France and Belgium ran its course, Dr Cockburn and his team at the TRE were putting the finishing touches one of the most elaborate pieces of electronic spoofery ever used: the simulation on radar of two huge ghost 'fleets', to divert attention away from the main Allied landing areas. Obviously, the simplest way to achieve this aim would be to use a large number of full-sized ships. But the invasion stretched Allied shipping resources to the utmost, and no large

ships could be spared for this purpose. Cockburn worked out a method of producing a huge radar echo, similar to that from a large assembly of ships, but using no real ships. By dropping Window (lengths of metal foil) from aircraft flying carefully arranged tracks, he hoped to erect an enormous radar reflector covering an area 16 by 16 miles or 256 square miles.[13]

The most important German coast-watching radar was the Seetakt operating in the 370 MHz band, and Cockburn planned his ghost 'fleet' spoof primarily against that system; he hoped it would also prove successful against other German radars, however. The beam width of Seetakt was 15°, so at a distance of 10 miles from the radar the beam was just over two miles wide. Allowing a margin for error, the plan called for Window clouds within two miles of each other along the frontage of the 'fleet' to produce a continuous 'blip' with no gaps on the Seetakt screen. The pulse width of Seetakt was three microseconds, which meant that the set could not discriminate between objects less than 520 yards apart in range. So to produce a continuous 'blip' on the radars in range, the Window clouds had to be closer than that. The bombers releasing the Window would fly at 180 mph, three miles per minute. Dropping Window at 12 bundles per minute would result in one bundle per 440 yards, sufficient for that purpose.[14]

Altogether, a full ghost 'fleet' operation required eight aircraft, split into two waves. The first wave of four would fly in line abreast with two miles between aircraft, and eight miles behind them would come the second wave in a similar formation. To simulate the advance of the 'fleet', the two waves of aircraft would fly a series of oblong 'race-rack' patterns, maintaining this formation, each oblong measuring eight miles by two. Each orbit would take 7 minutes, and at the end of each the formation was to move forward one mile. That would give a rate of advance for the formation — and therefore of the ghost 'fleet' — of 8 knots and make it look plausibly like an advancing assembly of ships. To add realism to the spoof, other aircraft would orbit over the English Channel radiating jamming on the German early warning radar frequencies. The positions of these orbits would be far enough from the German radars, so their operators to discern the fake 'invasion fleet' through the blanket of jamming.[15]

During May 1944 Cockburn ran a ghost 'fleet' towards captured German Seetakt, Freya and Wuerzburg radars set up on cliffs overlooking the Firth of Forth in Scotland: the spoof worked effectively against all of them. In this case the radar operators knew they were seeing a simulated invasion fleet, however. The next stage was to test the spoof against radar operators who had not been told what to expect. Eight bombers flew a ghost 'fleet' against a British Type 11 radar — the nearest equivalent to the Giant Wuerzburg — situated at Flamborough Head on the Yorkshire coast. The unsuspecting operators reported the echoes on their screens as having come from a very large convoy indeed — far larger than any they had seen before. Now Cockburn and his team could be reasonably confident that the spoof stood a good chance of working against German radar operators.[16]

Shortly before the invasion Cockburn obtained the use of an additional force to assist with his spoofs: four high speed air-sea rescue launches and 14 smaller naval launches, that were not required for other tasks on the morning of the invasion. To add realism to the ghost 'fleets', TRE engineers fitted the rescue launches with 'Moonshine' repeaters tuned to the 550 MHz Hohentwiel radar carried by German maritime patrol aircraft. Each launch was also to tow a float flying a 'Filbert': a 29-foot-long naval barrage balloon with a 9-foot diameter radar reflector mounted inside the envelope to produce a radar echo similar to that from a large ship. In addition to towing the floats, the naval launches were each to fly one 'Filbert' from their hulls.[17]

The carefully planned and rehearsed radar spoof operation had a major weakness, however, as critics of the scheme were quick to point out. 'What will happen,' they asked, 'if the Germans sent reconnaissance aircraft into the area and their crews saw with their eyes there is no invasion fleet?' Cockburn told this writer his standard reply to such a question:

The larger spoof, Operations TAXABLE, employed eight Lancaster bombers of No 617 Squadron and made for a point east of Le Havre. To reduce the chances of equipment failure each aircraft carried two GEE equipments, as well as two navigators and four men to dispense the Window

'Imagine the scene: a frightened under-trained young conscript radar operator sees the 'ghost' fleet on his screen and reports it to his headquarters as the long-expected enemy invasion force; so do his colleagues at other radar stations along the coast. Soon there appears a nice broad arrow on the situation map at the headquarters: the 'ghost' fleet is now a military fact. If aircraft were then to fly into the area and report it clear of ships, would their reports be believed? Probably not. The operation was to take place at night and the aircraft might be far off their intended tracks. Once a broad arrow representing an enemy attack appears on the situation map at a military headquarters, it is a military fact and it takes a lot to remove it.'[18]

It would remain to be seen whether Cockburn's prognosis would be proved correct, 'on the night'.

Destruction of the radars

The Typhoons and Spitfires had done well their

task of destroying the radar stations. By the evening of 5 June, seven long-range early warning radar sites had been put out of action, including all six of those to the west of Boulogne. Following the action Air Chief Marshal Trafford Leigh-Mallory, C-in-C of the Allied Expeditionary Air Force Commander, was able to report:

'In the vital period between 0100 and 0400 hours when the assault Armada was nearing the beaches, only nine radar installations were in operation and during the whole night, the number of stations active in the Neptune area was only 18 out of the normal 92. No station between Le Havre and Barfleur [on the north eastern tip of the Cotentin Peninsula] was heard operating.'[19]

With the 'softening up' phase complete, the jamming and spoofing phases could go ahead. In the hours preceding the invasion, the two ghost armadas 'set sail'. The larger spoof, Operations TAXABLE, employed eight Lancaster bombers of No 617 Squadron and made for a point east of Le Havre. To reduce the chances of equipment failure each aircraft carried two GEE equipments, as well as two navigators and four men to dispense the Window. The smaller of the two spoofs — Operation GLIMMER — was flown by six Stirling bombers of No 218 Squadron that headed for a point south of Boulogne. Each aircraft carried a GEE and a GEE-H navigational system, with three navigators to monitor the intricate flying patterns. The Stirlings also carried four men to dispense the Window.[20]

Orbiting to the north of the real and ghost invasion fleets were four B-17 Flying Fortresses of the US 803rd Bombardment Squadron and 16 Stirlings of the No 199 Squadron RAF. These aircraft put up a screen of jamming to cover the various operations, with the jamming deliberately thin to the east to allow the German operators to observe the TAXABLE and GLIMMER spoofs.[21]

Beneath the orbiting aircraft and their falling clouds of Window, the small flotilla of launches headed south into the choppy sea with their ungainly 'Filbert' balloons trailing downwind. Cockburn was full of praise for the Moonshine operators on the boats that night:

'The Moonshine operators came from an American Army signals unit. These men had arrived from Iceland too late to be brigaded into the main invasion, so they were given to us. They were absolutely first class. They hadn't seen any war, they were tickled pink at the idea of taking part and were keen as mustard. The launches ran in — can you imagine it, 6 knots in such a craft in a Force 6 sea? The Moonshine operators were seasick to a man but they operated their equipment magnificently.'[22]

Just after midnight the Moonshine operator in a GLIMMER launch observed signals from German airborne radar on his cathode ray tube. He tuned in his transmitter, and the game was on. During the next two hours he logged signals from eight separate aircraft and 'Moonshined' seven of them: the eighth was of too short a duration. Fifty miles to the west the Moonshine operators with the TAXABLE force also picked up German aircraft radar transmissions, which they too returned 'with interest'.[23]

When the ghost 'fleets' arrived at their stop lines some ten miles off the coast of France, the launches anchored the floats with the 'Filbert' balloons. Then they laid a smokescreen and broadcast over loudspeakers recordings of the squeals, rattles and splashes germane to a large number of seagoing ships dropping anchor.[24] Their deception task complete, the boats had a hasty withdrawal to get clear before the expected reaction from the defenders.

The spoof airborne invasion

While the TAXABLE and GLIMMER 'fleets' moved their laborious ways towards the coast of France, other mischief was afoot. Twenty-nine Stirling and Halifax bombers of Nos 90, 138, 149 and 161 Squadrons RAF staged fake airborne invasions — code-named TITANIC — in the Caen and Cap d'Antifer areas. On their way to the 'dropping zones' the bombers released large quantities of Window, to increase the apparent size of the force on enemy long-range radars.[25] At the spoof landing areas they unloaded dummy paratroops fitted with special fireworks, which exploded to give off the crackles and bangs of a ground battle in progress.

To isolate the real dropping zones from marauding German night fighters, 29 Lancaster and Flying Fortress bombers of Nos 101 and 214 Squadrons

Meanwhile, the armada of more than a thousand transport aircraft laden with paratroops and equipment and many towing gliders, delivered their loads and returned to England without losing a single transport aircraft to night fighter attack

RAF produced a screen of communications jamming over eastern France between Dieppe and the Somme River. The aircraft patrolled the area for four and a half hours, flying at altitudes between 24,000 and 27,000 feet to ensure that Luftwaffe night fighters operating to the west of the jamming screen received no instructions from ground controllers to the east of it.[26]

The Luftwaffe controllers fell into the trap and vectored their night fighters to intercept the ghost 'bomber stream' over eastern France. But once the fighters arrived in the area of the communications jamming they could receive no further instructions from the ground. One Lancaster involved in the operation was shot down, but the crew survived.[27] Meanwhile, the armada of

Once the Allied troops established a beachhead in Normandy, no power at Adolf Hitler's command could dislodge them

more than a thousand transport aircraft laden with paratroops and equipment and many towing gliders, delivered their loads and returned to England without losing a single transport aircraft to night fighter attack.

The first indication to the German High Command that a major seaborne force was moving towards the coast of Normandy, came at about 02.00 hours on 6 June when observers on the eastern side of the Cherbourg Peninsula reported hearing with their naked ears the rumble from the engines of the Allied ships.[28]

There is clear evidence that the German radar operators observed and reported the approach of the GLIMMER 'fleet'. A full-scale invasion alert was issued for the Calais-Dunkirk area, and motor torpedo boats were sent into the area to engage the 'invaders'[29] Dr Cockburn had predicted that 'Once a broad arrow representing an enemy attack appears on the situation map at a military headquarters, it is a military fact and it takes a lot to remove it'. His forecast is borne out to a remarkable degree by one German record of the morning's events. A telephone message logged at 10.15 hours on the morning of D-day at the forward echelon of the Luftwaffe High Command (by which time the spoof operations had been over for about six hours, and Allied troops were ashore in strength) contained a clear reference to Operation GLIMMER:

'On the night of 6 June the enemy carried out landings in the Seine Bay. Reports up to 0800 hours provide the following picture: at about 0300 hours a large number

of enemy landing craft and escorts neared the coast of the Seine Bay between Caen and Carentan. From observations on the coast and air reconnaissance, it appears that some 200 ships were involved. Landings appear to have been successful near Carentan and near the mouth of the Vire. The number of landing craft involved has not been reported. Near Bernieres 33 landing craft have been reported, and 44 more near the mouth of the Orne (north of Caen). It is estimated that eighty large landing craft would be able to put ashore 3 to 4 divisions.

'During the early morning darkness (first light was at 0500 hours) artillery fire fell at the following places: Grandcamp, Colleville, Arromanches. There are no reports on the positions of the ships doing the firing. Between 0600 hours and 0700 hours coastal observers reported six large warships, including battleships, and approximately 20 destroyers at a position 10 sea miles west of Le Havre. Further reports on assemblies of ships: at 0645 hours to the north of Lesardrieux [west of St Malo], where it has been specifically reported that no landings have taken place up to now. According to reports from reconnaissance aircraft, ships were assembling during the morning off Dieppe and Le Treport. ***The reports of ships assembling off Calais and Dunkirk at 0400 hours have not, so far, been confirmed.*** [Author's bold italics].'[30]

Reconnaissance aircraft and fast patrol boats were sent to scour the seas off the coast off Boulogne to search for the suspected invasion force.[31] But trying to prove a negative was a difficult business, and it took a disconcertingly long time to prove conclusively that the enemy force was not where it was is thought to be.

Operation TAXABLE, though apparently correctly flown, appears not to have been noticed by the defenders.[32] Despite a search of surviving German records, this writer found no report that can be linked to the spoof.

Some of the countermeasures prepared for OVERLORD were not needed. The Luftwaffe made no attempt to disrupt the airborne landings by jamming signals from the Eureka beacons marking the dropping zones, so the 'Lucero' Mosquitoes saw no action.[33] As the ground battle developed, the Allied fighter force maintained a powerful umbrella of patrols over the beachhead which prevented the Luftwaffe from mounting co-ordinated attacks into the area. As a result the huge Elephant Cigar communications jammer near Brighton, standing ready to beam a cacophony of jamming on the German aircraft radio channels, remained silent.

The rest of the story is well known. Once the Allied troops established a beachhead in Normandy, no power at Adolf Hitler's command could dislodge them. By sowing confusion and preventing German commanders from gaining an accurate appreciation of Allied movements, there can be no doubt that the radio countermeasures operations materially assisted the landings and did much to hold down casualties. In terms of the losses they saved, the resources committed to countermeasures operations had been minimal. For the student of electronic warfare, the operations in support of OVERLORD provide an object lesson on what can be achieved if a carefully planned program of countermeasures is used to support a one-of-a-kind operation of the highest importance.

Notes

1. Sir Robert Cockburn, interview.

2. RAF Signals History Volume VII, Radio Countermeasures, p 228.

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4. Cockburn interview

5. Telecommunications Research Establishment account The Radio War p 72-73

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13. Cockburn, R. The use of Window to simulate low level targets on enemy radar, TRE Memorandum 5/M.95, RC, 28 April 1944.

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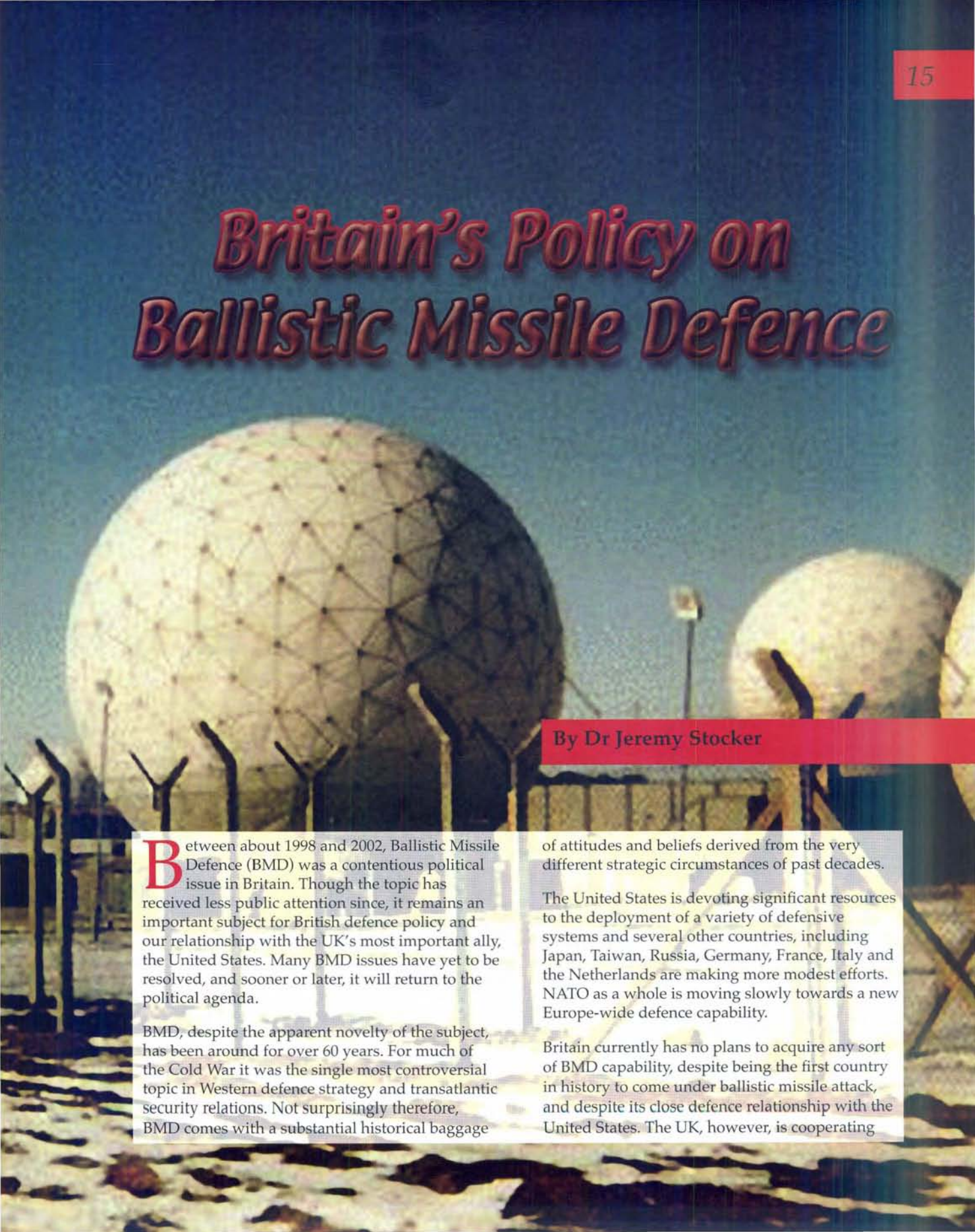
Britain's Policy on Ballistic Missile Defence



By Dr Jeremy Stocker

Between about 1998 and 2002, Ballistic Missile Defence (BMD) was a contentious political issue in Britain. Though the topic has received less public attention since, it remains an important subject for British defence policy and our relationship with the UK's most important ally, the United States. Many BMD issues have yet to be resolved, and sooner or later, it will return to the political agenda.

BMD, despite the apparent novelty of the subject, has been around for over 60 years. For much of the Cold War it was the single most controversial topic in Western defence strategy and transatlantic security relations. Not surprisingly therefore, BMD comes with a substantial historical baggage of attitudes and beliefs derived from the very different strategic circumstances of past decades.

The United States is devoting significant resources to the deployment of a variety of defensive systems and several other countries, including Japan, Taiwan, Russia, Germany, France, Italy and the Netherlands are making more modest efforts. NATO as a whole is moving slowly towards a new Europe-wide defence capability.

Britain currently has no plans to acquire any sort of BMD capability, despite being the first country in history to come under ballistic missile attack, and despite its close defence relationship with the United States. The UK, however, is cooperating

A total of 1,115 V-2s fell on the UK, causing 2,855 fatalities. The single worst incident was on 25 November 1944 when 160 people were killed by a single missile that struck Woolworth's in Deptford

closely with the US in the development of American defences and is host to two essential elements of US BMD at RAF Flyingdales and RAF Menwith Hill, both in North Yorkshire. This apparent paradox requires some explanation.

Historical background[1]

The first operational use of a ballistic missile came on 8 September 1944, when a German Army V-2 rocket landed in Chiswick, west London killing two people and injuring several more. During the following six and a half months, a total of 1,115 V-2s fell on the UK, causing 2,855 fatalities.[2] The single worst incident was on 25 November 1944 when 160 people were killed by a single missile that struck Woolworth's in Deptford. The port of Antwerp in Belgium was subject to an even greater onslaught once it became the Allies' main re-supply base on the Continent.

Britain's experience in facing the V-2s contained many elements that were to become features of subsequent ballistic missile threats: An uncertain but improving intelligence picture, the establishment of an early warning network, a large-scale counter-force bombing campaign to destroy rockets on the ground, passive measures to ameliorate the effects of missile strikes, and

By the time the V-2 offensive opened, the Luftwaffe's attacks with V-1 cruise missiles had already been underway for three months. By late August . . . all but four out of 97 V-1s approaching the UK were shot down. The V-2 was an altogether different problem

elaborate but untested active defences to intercept missiles in flight.

The early warning system was based on existing radars. The amount of warning obtainable was insufficient to be of much use, not least because with a maximum range of only 200 miles but supersonic speed the V-2 was airborne for less than five minutes. Subsequent analysis of records did, however, enable launch sites to be pinpointed for air attack.[3] RAF Bawdsey in Suffolk played a crucial role in this.

Air attacks were, however, costly, largely ineffective and a substantial diversion of air assets that otherwise would have been used to support the Allied ground offensive. Out of approximately 6,800 sorties, 450 aircraft and more than 2,300 aircrew were lost.[4] The German Army itself later reported that only 48 rockets had been damaged as a result of these efforts.[5]

By the time the V-2 offensive opened, the Luftwaffe's attacks with V-1 cruise missiles had already been underway for three months. By late August, gun-based air defences supplemented by fighters were getting on top of the problem. On 28th all but four out 97 V-1s approaching the UK were shot down.[6] The V-2 was an altogether different problem.

Whilst early warning and the bombing campaign were RAF responsibilities, trying to shoot down the V-2s was up to the Army's Anti-Aircraft Command — fighters were of no avail against a supersonic target following a ballistic trajectory. An early scheme entailed a 40km-wide barrage of gunfire in the path of an approaching rocket. An estimated 320,000 rounds of ammunition would be needed for

RAF Flyingdales became operational in early 1964 with the US meeting 80% of the initial cost. BMEWS provided early warning of Soviet missile attack to enable the British retaliatory force – the V-bombers – to get airborne

each V-2. About 2% could be expected to fall back to earth unexploded — a total weight of nearly 90 tons of explosive which was likely to cause much greater damage than the one-ton warhead of the V-2 itself.[7] The idea was clearly impracticable. Later schemes were more sophisticated, being based on better target tracking and using predicted fire rather than a crude barrage.

However, before this new plan could be tried the V-2 attacks ceased. In the end, the V-2 was defeated by the same means as Iraq's ballistic missiles in 2003 — by the advance of ground troops that, by late March 1945, had forced the V-2 launch crews to retreat out of range of the UK.[8] One V-2 was shot down — by a bomber. A V-2 launched from the Netherlands passed right through a formation of USAAF B-24 Liberators returning to England, and was successfully engaged by a .50 calibre machine gun.[9]

From World War Two until today, defence against ballistic missiles has been under constant consideration in Britain. The War also left another legacy. Both the Soviet and American missile programmes were initially based on German designs, components and engineers. For many years, the V-2's chief designer, Wernher von Braun, headed the US rocket programme, and early Soviet

ballistic missiles were direct copies, and then developments, of the V-2.

In the early post-war years there were neither the resources nor technical means to address future V-2-type threats. In 1950 the Defence Research Policy Committee (DRPC) asserted that 'No effective means of defence is in sight against long-range rockets . . .'[10] However, it was becoming increasingly clear from sketchy intelligence assessments that the Soviet Union was devoting considerable resources to its missile programme,[11] and that in future rockets would become the preferred delivery means for atomic warheads. Accordingly, by 1954 the DRPC had recognised that 'Defence against the ballistic rocket is a vital requirement . . .'[12]

The upshot was an Air Staff Target (AST 1135) for an active defence system, issued in February 1955.[13] This initiated a range of research projects, mainly at the Royal Aircraft Establishment in Farnborough and the Royal Radar Establishment in Malvern and was followed by a more specific Air Staff Requirement in November 1957.[14] By now Russian ICBM tests followed by the launch of Sputnik — the world's first satellite — had showed how far advanced the Soviet Union was with its missile programme. A practical defence was still years away (1965 at the earliest), so 'The safety of the United Kingdom . . . depends on deterring the Russians from attacking it. This can only be achieved by the counter-threat of nuclear retaliation'.[15]

Whilst research into a dedicated Anti-Ballistic Missile (ABM) interceptor proceeded, a proposal was made to deploy an 'interim' system based on the Bloodhound Mk.3 surface-to-air missile.[16] This was to carry a small nuclear warhead that was considered essential to intercept and destroy supersonic ballistic warheads.[17] Cancellation of the Mk.3 in favour of the conventionally armed, but mobile Mk.2 in 1960, put paid to these plans.

One aspect of the defence problem was solved — early warning. A UK national requirement was merged with the need of the United States to find a third Ballistic Missile Early Warning Station (BMEWS) in Europe. The first two sites were in Alaska and Greenland. US and UK requirements would have been met from stations in Scotland and Norfolk, respectively, so a compromise site was found in North Yorkshire. Following agreement in 1960,[18] RAF Flyingdales became operational in early 1964 with the US meeting 80% of the initial cost. BMEWS provided early warning of Soviet missile attack to enable the British retaliatory force — the V-bombers — to get airborne.

A similar arrangement for a satellite warning ground station at RAF Kirkbride near Carlisle foundered as the Americans had difficulty developing the infrared sensors. A system was eventually deployed in the early 1970s, the Defense Support Program (DSP), though without any UK involvement.

By now the technical and financial challenges in developing an effective defence system were clear. The essence of the problem was that traditional notions of what constituted a worthwhile defence were no longer valid, in the face of a threat that was both numerous and nuclear. Even a 90% effective defence (if such could be devised and afforded) was to little avail if even a handful of megaton-range thermonuclear warheads were to get through. To make matters worse, it was assessed that missile decoys could completely swamp any defence.[19] This latter judgement was, however, premature. No such 'penetration aids' were ever deployed on Soviet missiles (both the Russians and Americans opted for multiple warheads instead). More valid was the realisation that it was easier and cheaper to improve and enlarge the offence than the defence.

During the early 1960s, therefore, research into active defence came to a halt. Henceforth the UK would rely, to a greater extent than did either of the superpowers, on nuclear deterrence. Both the United States and the Soviet Union continued to develop active defences. The latter in particular had obvious implications for Britain's small (and in future missile-delivered) deterrent. For the next 30 years, therefore, Britain's attention to BMD would be focused on others' defences rather than her own.

There is no chance of a Polaris A3 payload surviving a successful intercept. This was of critical importance as the Soviet Galosh ABM system defended the one target of real interest to Britain — Moscow

Real intelligence (as opposed to speculation) about Soviet BMD efforts was not obtained until the mid-1960s. Work on countering defences had been underway in Britain since the late '50s, initially on the later to be cancelled *Blue Streak* IRBM. Once the *Polaris* programme was under way, but even before it entered service, intelligence estimates suggested that all its three warheads, which separated by a distance of only 10 miles, would be vulnerable to a single megaton-range exoatmospheric nuclear burst. By 1970 the assessment was that '. . . there is no chance of a Polaris A3 payload surviving a successful intercept'.[20] This was of critical importance as the Soviet *Galosh* ABM system defended the one target of real interest to Britain — Moscow.

After much deliberation over many years and two changes of government, the result was the *Chevaline* Polaris Improvement Programme. Drawing initially on earlier American work (*Antelope*) that was never fully developed, *Chevaline* finally became operational in 1982.[21] It substituted a sophisticated Penetration Aid Carrier (PAC) with over 40 decoys for one of the three Polaris A3 warheads. The remaining two warheads were hardened and made stealthier.

Chevaline remains to this day the only comprehensive system of 'penaids' ever deployed on a ballistic missile, and gives the UK a unique insight into the challenges inherent to developing an effective means of overcoming missile defences — a topic of much controversy in later years.

Until the mid-1960s, interest in missile defence had been confined to the Ministries of Defence, War, Air and Supply. Soon after the Labour Government under Harold Wilson came to power in 1964, the Foreign Office took up the subject, becoming concerned about the implications of American efforts to develop an ABM system. The FO quickly identified the potential for transatlantic difficulties over the issue, something that would remain true for the next four decades. Now that the UK had given up on the attempt to provide a defence (about which the FO was hitherto oblivious),[22] it became a staple of British foreign policy that others should, so far as possible, be persuaded to do likewise. There were several reasons for this, and all have been enduring features of British attitudes towards missile defence.

Whilst defences might not negate the large offensive arsenals of the superpowers, they could pose a real threat to the much smaller nuclear forces of a country like Britain. Arms control was high on the new government's international agenda, and defence systems could only complicate efforts to secure limitations in offensive weapons.[23] The US nuclear 'umbrella' was the ultimate guarantor of Western security, and the British view was that transatlantic solidarity rested on a shared vulnerability. If America and the Soviet Union felt themselves invulnerable, Europe might once again become 'safe' for large-scale conventional warfare or even a 'limited' nuclear war.

Many of these concerns were actually shared by the US Administration itself, especially the Defense Secretary Robert McNamara. Nonetheless, Congressional pressure forced McNamara to announce a limited ABM deployment in September 1967, though the *Safeguard* system did not become operational (and then only briefly) until 1975.

By 1970 arms control talks between the United States and the Soviet Union were well underway, and it was clear that ABMs were top of the agenda. British worries therefore largely subsided, and in 1972 the Anti-Ballistic Missile (ABM) Treaty limited America and Russia to just two ABM sites each, which was further reduced to one each by a Protocol two years later. The ABM Treaty underpinned several succeeding agreements on offensive weapons. It also ensured that Soviet defences would not become so numerous as to negate Britain's own nuclear deterrent, but by allowing the defence of Moscow gave the final impetus to the development of the *Chevaline* system. Though Britain was not a signatory of the ABM Treaty, it became a bedrock of British policy for the next 30 years.

Whilst the *Chevaline* project proceeded in secrecy during the 1970s, the BMD issue went very quiet, although both the United States and the Soviet

Soviet missiles such as the SS-20, -21 and -23 would be used in the opening phase of a future offensive. Their invulnerability to NATO air defences meant they could be used tactically to destroy those defences to open up the way for subsequent attacks by manned aircraft

A Russian SS-20 missile being launched

Union did continue research. Moscow by now had an operational defence system, though the Americans' equivalent was decommissioned almost as soon as it entered service, on grounds of cost and operational effectiveness.[24]

All this changed on 23 March 1983. In a now-famous speech President Ronald Reagan identified a need to '. . . break out of a future that relies solely on offensive retaliation for our security . . .'[25] He went on to initiate an ambitious research and development programme into a space-based defence system (the Strategic Defense Initiative, known to is detractors as 'Star Wars') which would eventually render offensive nuclear weapons obsolete.

The announcement took the British Government (and most of the US Administration) completely by surprise. Though its public reaction was muted, Margaret Thatcher's government was deeply suspicious of anything that might undermine a condition of stable deterrence between East

and West.[26] At a series of meetings with Reagan, Thatcher was able to secure agreement that the US would continue to abide by the ABM Treaty (which forbade the deployment of country-wide defences, but not research and development), and a renewed commitment to nuclear deterrence.

The Foreign Secretary Sir Geoffrey Howe enunciated the Government's worries: *'Deterrence has worked: and it will continue to work. It may be enhanced by active defences. Or their development may set us on a road that diminishes security . . .'*[27] British and American views on SDI were never fully reconciled: *'Whereas Britain viewed the SDI programme as research to help decide whether to proceed with BMD, the Reagan Administration tended to see it as research on how to proceed.'*[28]

As a further twist, in 1985 Allied countries were invited to participate in SDI research, partly as a means of winning international support for the project. This offered Britain two advantages. First, it would allow British companies and research institutions to bid for American contracts, and second, it would give Britain an inside view of SDI's technological possibilities. The UK was therefore the first country to sign a Memorandum of Understanding (MoU), in December 1985, and it also set up an SDI Participation Office (SDIPO) within the MoD. By the end of the decade, about $100 million-worth of work had been awarded to Britain. The other objective behind participation was also met. It became a consistent view within the SDIPO that SDI had little chance, for the foreseeable future, of defeating a large-scale attack. Nuclear deterrence remained intact.

NATO was also taking a fresh look at BMD, though from a different standpoint. It was expected that a new generation of more accurate Soviet missiles such as the SS-20, -21 and -23 would be used in the opening phase of a future offensive. Their invulnerability to NATO air defences meant they could be used tactically to destroy those defences to open up the way for subsequent attacks by manned aircraft.[29] The ABM Treaty did not prohibit defence against these 'theatre' threats, and the UK completed an Architecture Study on behalf of NATO and the US SDI Office. One option considered was a UK purchase of Patriot missiles to replace the venerable Bloodhound system.[30]

All these efforts were soon overtaken by events. By 1987 the Cold War was easing, as exemplified by the signing of the Intermediate Nuclear Forces (INF) Treaty. Within two years the Cold War was over, soon followed by the disintegration of the Soviet Union itself. The rationale for SDI was gone, though many would argue that the pressure that SDI put on the Soviet Union contributed to the latter's demise. The first Bush Administration scaled-back missile defence efforts considerably, and re-focused them against small-scale accidental or unauthorised strikes. This was to be the Global Protection Against Limited Strikes (GPALS). This too was short-lived, as in January 1993 Bill Clinton replaced Bush in the White House. Strategic missile defences were once again off the agenda.

After the Cold War

No sooner had the Cold War come to an end, than a new type of BMD came to the fore. By now over 30 countries were operating ballistic missiles, most of the shorter-range 'theatre' variety. About 650 had already been used in the 1980s Iran-Iraq War.[31] More conspicuously, during the 1991 Gulf War Iraq fired 82 *Al Hussein* missiles at targets in Israel and Saudi Arabia. These were locally modified versions of the venerable *Scud* first introduced into service by the Soviets in the late 1950s and widely exported since. One missile hit a US barracks in Dhahran, killing 28 servicemen (20% of all US combat deaths in the war), whilst another narrowly missed the USS *Tarawa* alongside in Al Jubayl. The attacks on Israel featured on nightly news broadcasts around the world.

American BMD efforts were therefore quickly re-directed away from defence of North America against long-range ICBMs (though some work did continue), towards the 'theatre' defence of regional allies and deployed forces overseas against shorter-range threats like the ubiquitous *Scud* and its several derivatives. Also significant was that ballistic missiles were being used to deliver conventional warheads, which during the Cold War had been considered (within NATO at least) as both uneconomic and unlikely.

In the light of the Iraqi attacks and in view of the prominence now being given to Theatre Missile Defence (TMD) by the United States, the UK Defence Secretary Malcolm Rifkin confirmed in 1994 that 'We are considering whether there might be a need for a Ballistic Missile Defence system in future'.[32] This was done by means of a Pre-Feasibility Study (PFS), led by British Aerospace (now BAE Systems).[33] The PFS examined 16 possible scenarios including a variety of ballistic missile threats, and devised a series of missile defence architectures to meet them. The US *Patriot* system again featured in many of them, although the MoD's Staff Target 1235 for a medium-range SAM system to replace Bloodhound was allowed to lapse. A British development with BMD potential was the Multi-Function Electronically Scanned Adaptive Array (MESAR) radar, an operational derivative of which would later be selected for the Royal Navy's future Type 45 air defence destroyers.

Whilst the Study was underway a junior Defence Minister told the *Times* that 'there is a *prima facie* case for having a ballistic missile defence system . . .'[34] The PFS was completed in 1996, recommending that the Government move to the next stage, a Feasibility Study which would imply a firm commitment to procure some form of TMD system. However, a General Election was approaching.

After coming to power in May 1997, the new Labour Government embarked on the Strategic Defence Review (SDR). It was clear early on that BMD was not on the new government's agenda.[35] When published in July 1998,[36] the SDR made only scant references to the subject at all. It did state that:

'A number of systems intended to destroy ballistic missiles are under development, notably in the United States. These may play a role within a balanced spectrum of capabilities to counter the risks posed by chemical and biological weapons and their means of delivery. But technologies in this area are changing rapidly and it would, at this stage, be premature to decide on acquiring such a capability. We will, however, monitor developments in the risks posed by ballistic missiles and in the technology available to counter them, participate in NATO studies and work closely with our allies to inform future decisions.' [p5-15]

The Review concluded that:

'. . . we do not need to procure a new ground launched medium or long-range air defence missile. We...have established a technology development programme to keep this option open...if a new ballistic missile threat to this country were to emerge.' [p.38]

SDR was therefore linking BMD policy to the future emergence of a (non-Russian) threat to the UK itself, rather than the need to protect expeditionary forces deployed overseas. The thinking behind this was elaborated by soon after by the MoD's Director of Defence Policy. Deterrence remained the best response to nuclear threats. Conventionally armed ballistic missiles, the Gulf War experience notwithstanding '. . . do not in themselves pose a sufficiently serious threat to justify specific countermeasures.'[37] The ballistic threat was therefore refined down to a chemical and biological one, which was unlikely 'in the near to medium term'. This approach was widely criticised, including by the Labour-dominated Commons Defence Select Committee.[38]

Nonetheless, SDR did initiate a new set of studies, the Technology, Readiness and Risk Assessment Programme (TRRAP). In contrast to the SDR itself, the TRRAP examined the threats to deployed forces and defensive technological issues to enable the MoD to act as an 'intelligent customer' in any future procurement decisions. It concluded in February 2002 that '. . . ground-based interceptors employing hit-to-kill are a feasible mechanism to counter Theatre Ballistic Missile systems'.[39] Kinetic energy had now replaced nuclear explosions as the preferred 'kill mechanism' for BMD.

The Government's policy remained unchanged, however, the Defence Secretary repeatedly stating that:

'The Strategic Defence Review concluded that the technologies related to ballistic missile defence are changing rapidly and it would be premature to decide on acquiring such a capability. This remains our policy.'[40]

Within the MoD, protection of deployed forces was becoming uncontroversial, and following TRRAP TMD was passed to the Directorate of Equipment Capability for Theatre Airspace [DEC(TA)] as a potential procurement item. But with air defence generally assuming a lower priority, the prospects for acquisition of any active defence system were no greater than before.

In the United States the defence of the US itself was once again returning to the political agenda. Development of a range of Army and Navy TMD systems continued. More significantly for the UK and America's other allies, the sceptical Clinton Administration was pushed, like the Johnson Administration in the 1960s, towards deployment of a system to defend the United States itself. Pressure for this came from a Republican-dominated Congress, to which added weight was added in 1998 with the publication of the report of the Commission to Assess the Ballistic Missile Threat to the United States. Known as the Rumsfeld Commission after its Chairman Donald Rumsfeld (later George W Bush's Defense Secretary) the report concluded that:

'A new strategic environment now gives emerging ballistic missile powers the capacity, through a combination of domestic development and foreign assistance, to acquire the means to strike the US within about five years of a decision to acquire such a capability (10 years in the case of Iraq). During several of those years, the US might not be aware that such a decision had been made.'[41]

The following year North Korea test-fired a long-range missile that passed over Japan, and both India and Pakistan also conducted missile firings. In July 1999 Clinton signed the National Missile Defense Act, and a missile defence budget of over $10 billion was authorised.

All these developments took European governments somewhat by surprise. Reactions tended to reflect the concerns aroused by the ABM and SDI controversies of the '60s and '80s: differing views on the severity of the threat, the implications for stable deterrence, the effect on arms control, relations with Moscow, de-coupling of US and European security, and Alliance consultations. There was also a good deal of scepticism about the technical feasibility and financial cost of tactical, never mind strategic, missile defence. Peter Hain, then a junior Foreign Office Minister, said 'I don't like the idea of a Star Wars programme, limited or unlimited. Unilateral moves by Washington would be very damaging,'[42] though other Government spokesmen were more circumspect.

National Missile Defense (NMD) posed a real dilemma for the British Government. The nature of its close defence and intelligence ties made Britain more sensitive to American security concerns, and more reluctant to openly criticise US policy, than many other European states, especially France. On the other hand, Britain had real concerns about NMD and wanted to be seen, in security terms, as a 'good European'. The result was '. . . an official policy to have no policy . . .'[43] It came as a relief, therefore, when Clinton announced in September 2000 that he was deferring a deployment decision, citing technological problems and the implications for relations with Russia, China and US Allies as the reasons.[44] The respite was only to be temporary.

Missile defence in the 21st century

When George W Bush entered the White House in January 2001, he was already heavily committed to missile defence in a way that his predecessor never had been. The new American President had already promised that, if elected, he would '. . . build effective missile defenses, based on the best available options, at the earliest opportunity'.[45] An early consequence was the scrapping of the hitherto well-understood distinction between Theatre and National Missile Defence (TMD and NMD). 'What's 'national' depends on where you live, and what's 'theater' depends on where you live.'[46] Instead, the new Administration was committed to engaging all forms of ballistic missiles in all phases of their trajectory.

The US Government's unequivocal intention to press ahead with a multi-faceted BMD strategy has forced foreign governments, especially the British, to examine the issue more closely. Once it was clear that American missile defence deployment was

A Phantom of No 43 Squadron RAF intercepts a Soviet Navy Tupolev Tu-95RT 'Bear-D' approaching UK airspace

Although the UK welcomed the stability brought by the ABMT to the Cold War stand-off, it is important to recognise that it is the stability which is important, not the mechanism by which it is achieved

a question, not of 'if', but 'how' and when', the Foreign Office resolved to ensure that '. . . Missile Defence is pursued in a way which protects UK interests and minimises divisions within NATO'.[47] How far British thinking has moved on was shown by a statement from the new Foreign Secretary, Jack Straw: '. . . we in this country have long recognised the case, in appropriate circumstances, for measures of missile defence'.[48] He added that 'There is an overwhelming case for missile defence in principle . . . Our view is that the United States is fully entitled to want to develop systems of missile defence'.[49] This is a dramatic, if little noticed, shift in British official thinking which since the 1960s had consistently viewed missile defence as destabilising.

The catalyst for this shift in policy was the ABM Treaty. The Bush Administration's ambitious plans for BMD were self-evidently incompatible with

the Treaty. Until now it had underpinned Britain's entire approach to security in the nuclear age. The risks of nuclear war were to be minimised by the arms control process, at the heart of which lay the ABM Treaty. The Treaty also ensured the credibility of the UK's own small nuclear deterrent by severely limiting BMD deployments by the superpowers, and forbade the transfer of ABM systems to third parties. All this would be threatened if either Russia or the United States withdrew from the Treaty (which they were entitled to give six months' notice of doing).

In December 2001 the United States did just that. Six months later, on 13 June 2002 the ABM Treaty was no more. In the event, the Treaty went with a whimper rather than the widely expected bang. Though the Russians had vociferously opposed US withdrawal, once it was a *fait accompli* they made best of the situation and far from starting a new arms race (which they were in no position to do), reached a further agreement on nuclear arms reduction with the US.

At the end of 2002 the MoD issued a BMD 'Public Discussion Paper', at least in part to explain the change in attitude that had been forced upon it:

'The suggestion that missile defence would spark an arms race . . . needs to be taken seriously. It is possible that states in the process of developing long-range missile capabilities would seek to intensify these efforts in an attempt to overcome any defences. On the other hand . . . it is perhaps more likely that missile defence would succeed in dissuading countries from taking this ever more difficult and expensive path. Many feared that US withdrawal from the Anti-Ballistic Missile Treaty (ABMT) . . . would cause global instability, damage international relationships and create an arms race. But this has not happened.

'Although the UK welcomed the stability brought by the ABMT to the Cold War stand-off, it is important to recognise that it is the stability which is important, not the mechanism by which it is achieved.'[50]

Britain's interest in US missile defence is not motivated purely by its wider significance for 'strategic stability'.[51] Whilst acquiring defences for the UK itself might not yet be regarded as an urgent priority, the issue of British participation in American defences has been both pressing and important. Partly because of another historical legacy, British territory is necessarily included in US plans. The subject is not, therefore, one for abstract policy debate as in many other countries.

From 1964 onwards, the BMEWS site at RAF Flyingdales performed a purely early warning role, mainly in support of US and UK nuclear retaliatory forces. But the evolution of plans for a limited defence of North America has obvious implications for BMEWS, as it would perform an essential role in alerting other elements of the system.[52] Not only would this require permission from the British Government (noting that the station is operated by RAF personnel), but whilst it remained in force, was in contravention of Article IX of the ABM Treaty. The Foreign Office had already assessed the potential significance of Flyingdales:

'Without the involvement of the Upgraded Early Warning Radar at RAF Flyingdales, the ability of the proposed system to meet threats to the United States from North Korea would be unaffected. But its effectiveness in meeting threats to the United States from the Middle East would be likely to be significantly impaired.'[53]

The issue of Flyingdales featured prominently in the MoD's Public Discussion Paper, and indeed the expectation that the US Government would soon request the use of Flyingdales for missile defence was one rationale for the Paper itself. The UK Government would '. . . agree to a US request for the use of UK facilities for missile defence only if we believe that doing so enhances the security of the UK and the NATO alliance'.[54] Only a week after the Paper was released, the long-awaited request from the Americans arrived. In February 2003 the Government gave formal assent to the use of the station, and for the necessary hardware/software upgrades required. Geoff Hoon the Defence Secretary pointed out the potential bargain on offer:

'An upgraded radar at RAF Flyingdales would provide us, at no cost to the United Kingdom, with a vital building block on which missile defence for this country

Menwith Hill, like Flyingdales, has become caught-up in the wider NMD controversy. It has been the object of protests and a spectacular 'break-in' by 'peace activists' opposed to anything to do with missile defence

and for our European neighbours could be developed if the need arose, and if that is what we decide.'[55]

The BMEWS station at RAF Flyingdales is not the only site on British soil potentially involved in American missile defence. In March 1997 the British Government agreed that the existing US National Security Agency signals intelligence site at RAF Menwith Hill, also in North Yorkshire, could be used for a European Ground Relay Station for the Space-Based Infra-Red System (High) [SBIRS(High)].

SBIRS(High) will comprise four geo-stationery satellites and a further two in a highly elliptical orbit, replacing the existing DSP system from around 2006. A second component, SBIRS(Low) will comprise a larger number of low-orbit satellites capable of tracking ballistic missiles after booster burnout, which the current DSP cannot. SBIRS(Low) will not, however, utilise facilities in the UK.

Like DSP before it, development of SBIRS began independently of active missile defence. The 1997 agreement pre-dated the NMD controversy in Britain, and, as SBIRS(High) simply replaces an existing capability, no doubt seemed uncontentious at the time. More recently, however, Menwith Hill, like Flyingdales, has become caught-up in the wider NMD controversy. It has been the object of protests and a spectacular 'break-in' by 'peace activists' opposed to anything to do with missile defence. Unlike BMEWS, SBIRS has not yet been the subject of a US request to use facilities in Britain

for active defence, possibly because of delays in the programme. With a clear precedent having been set by Flyingdales, however, it seems highly unlikely that any future request would be denied.

In July 2002 President Bush formally invited other nations, including the United Kingdom, to consider joining the US missile defence programme. This did not come as a surprise to the British Government, which had long been engaged in detailed consultations with the United States.[56] There had, for some time, been speculation that the US might, in addition to asking for the use of Flyingdales, wish to position an X-Band radar and/or ground-based missile interceptors in the UK as part of its expanded plans for missile defence. If that were to happen, some sort of defensive cover would be extended to the UK.[57]

The Commons Defence Committee asked Geoff Hoon in March 2002:

'is . . . the British Government keen to accept the United States' offer of that [BMD] system being used to protect the people of this country, on the assumption that the system the United States produces is capable of doing that? Is there any reason, in principle, why the United Kingdom would not accept such an offer?' [Defence Secretary] No.[58]

An MoD official later confirmed that:

'. . . the Flyingdales radar coupled with some form of interceptor system, ground-based or sea-based, somewhere around north-western Europe would provide a capability to protect the United Kingdom. If you want a more robust, more layered system and one that is capable of defending a larger tranche of the European continent, then further installations would probably be necessary . . . in other parts of the continent.'[59]

This would come at a cost to Britain. A highly speculative figure of £5-10 billion was given by the MoD in 2002.[60] This represents expenditure on a scale comparable with other major weapons acquisition projects such as *Trident* or the *Typhoon* Eurofighter. In the words of the then Chief of the Defence Staff: 'There is no way . . . we can pay for any missile defence from within the existing [defence] budget.'[61]

The 2003 Defence White Paper indicated that BMD was under active consideration, but that a British decision to acquire any defence capability was still some way off:

'Missile Defence . . . technologies are developing rapidly, [but] missile interceptors and other means of destroying missiles will only be able to deal with a limited ballistic missile threat. They are not a substitute for nuclear or other forms of deterrence. However, the addition of active missile defences may complicate the thinking of an adversary. We . . . will continue to examine, with our NATO Allies, the complex web of strategic issues to inform future political and policy decisions. Active missile defences could provide an option for meeting the threat from WMD and its means of delivery. But we will need to consider the right balance of investment between it, forces for nuclear deterrence, and other deterrent, defensive and preventive strategies.'[62]

The request to upgrade Flyingdales and to use it for missile defence purposes was accompanied by a proposal for a new Research, Development, Test and Evaluation Memorandum of Understanding between the two governments.[63] Anglo-American cooperation in BMD technical research had been continuing under the terms of the 1985 MoU. A replacement agreement, updating the existing arrangements, was signed in Brussels in June 2003.[64] To implement the new MoU, the UK has established a Missile Defence Centre (MDC) involving UK industry, the MoD and its own research laboratory, DSTL. The aim is to 'establish a lead role in Missile Defence for Europe and a significant role for UK industry in the US Missile Defence programme — at the same time as providing advice to MoD Policy staffs'.[65]

The MDC's budget is, by US standards, extremely modest — about £5 million per year. In essence, it continues the TRRAP 'intelligent customer' approach, spending just enough to keep abreast of technological developments whilst avoiding any procurement commitment.

The UK has also been playing a leading role in NATO's developing policy on BMD. The first post-Cold War NATO Strategic Concept in 1991 identified '. . . the proliferation of . . . weapons of

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19 AVIA 65/1869 BMD(TSC)(61)3 18 January 1961

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A 'No-Fly Zone' (NFZ) was established over Northern Iraq after the 1991 Gulf War, under the authority of UN Security Council Resolution 688, in order to protect the indigenous Kurdish population from repression. The NFZ was policed initially by aircraft from the air forces of the USA, Britain and France, flying from airfields in Turkey. A similar NFZ was established over Southern Iraq in the following year.

Effects Based Operations: A case for the primacy of Effects

By Ryan Clow

The term Effects Based Operations, or EBO, is becoming prevalent in the lexicon of many Western militaries. As the limitations of the current Objective-based approach to operational planning are revealed, an alternative is being sought. Effects — versus Objectives — may well become the central consideration for the planning, execution and evaluation of military operations.

As established leaders in the field of Western military concept development, the United Kingdom (UK) and the United States (US) are grappling with the concept of EBO in an attempt to define that concept and determine its implications. However, neither country currently practices what could be called EBO.

This paper will provide an assessment of the US and UK EBO concept development with a view to contribute some basic thoughts on EBO, and will focus on one small, yet important aspect — the 'identification' of *effects*.

The US view of Effects Based Operations

The United States Joint Forces Command (USJFCOM) has defined EBO as:

'A process for obtaining a desired strategic outcome or 'effect' on the enemy, through the synergistic, multiplicative, and cumulative application of the full range of military and non-military capabilities at the tactical, operational, and strategic levels.'[1]

F-16 with LITENING pod

EBO put simply, are those operations that are planned, executed, assessed and adapted as a result of a comprehensive understanding of the operational environment in order to influence or change behaviour or capabilities by exploiting the integrated application of selected Instruments of Power to achieve directed objectives

The US definition is a good starting point for the discussion in that it relates EBO to a well-understood concept (levels of command). However, it fails to provide a precise definition of what EBO are. Additional definitions of Effects Based Planning[2] and Effects Based Targeting[3] do provide greater amplification and clarity to the American body of thought that seemingly culminates in an Effects Based Strategy.[4] Some pertinent aspects should be retained from the US body of thought, particularly in terms of revising the current operational planning process 'non-lethal', or more aptly non-kinetic[5] targeting and the use of all available and relevant resources (both military and non-military) to facilitate successful national power projection.

The UK view of Effects Based Operations

In an initial concept paper[6] the UK took a slightly different approach to providing a definition, that is, the British established a 'conceptual framework of Effects' and sought clarification of their ideas in a more extensional manner by associating four definitions:

'***Strategic Aim***: *A single, unambiguous purpose attained by the achievement of one or more objectives.*

Objective: *The intended state of affairs to be achieved by the aggregation of specified Effect(s).*

Effect: *The physical or cognitive consequences at any level within the Strategic environment of one or more military or non-military actions.*

***Action**: The process of doing or acting at any level.*'

That paper emphasised the inter-dependency of these four definitions and their aggregates in order to produce an Effects Based Approach.[7] Regrettably, the British paper seemed to fall short in providing a precise definition of a complex concept. To be fair in criticism, the subject paper had a limited purpose: to achieve consensus on these terminologies and their relationship. In that respect, the document is rich in describing the complex relationship between Effects and the levels of command. More importantly, it contains a simple, yet brilliant paragraph on the classification or characteristics of Effects as being intended / unintended, desired / undesired, decisive, enabling, instantaneous / delayed, localised / distributed, permanent or temporary, or a combination thereof.[8] These observations allow for an appreciation of the careful consideration required in order to ensure the Effect achieved is the desired Effect.

In a more recent paper, the UK has refined their body of thought and provided greater fidelity:

'*[EBO] put simply, are those operations that are planned, executed, assessed and adapted as a result of a comprehensive understanding of the operational environment in order to influence or change behaviour or capabilities by exploiting the integrated application of selected Instruments of Power to achieve directed objectives*'.[9]

The entire body of thought is similarly rolled-up into what has been called the 'Effects Based Approach' in order to produce a 'common way of thinking that promotes an outcome-based (versus activity based) approach'.[10] Similar to the initial UK paper on the subject, the revised version contains another simple, yet brilliant paragraph on an Effects Based Planning (EBP) process (analysis, planning, execution, assessment) that highlights the requirement for EBP to be conducted in an integrated rather than linear fashion.[11]

The crucial detail to take from both the US and UK approaches is that they appear to ultimately subordinate Effects to Objectives. This creates the impression that desired Effects must be identified or formulated after Objectives. It is the assertion of this paper that this is the wrong approach. Rather, the identification of Effects should come before Objectives are established, particularly at the strategic level. The early identification of effects (before objectives) contributes to EBO in three primary ways: comprehensive operational planning (Effects Based Planning), flexible command and control (Effects Based C2) and capable targeting (Effects Based Targeting).

The primacy of effects

Noting the perceived shortcomings in the UK and US definition, as well as the assertion that there may be a critical distinction to be made from the US and UK approach in terms of the identification of Effects, the following is put forth as a more analytical definition of EBO:

'*Effects Based Operations are those operations that identify the desired Effect(s) at the outset of the planning process. Desired Effect(s) will then act as the primary means to convey strategic intent to ensure the selection of appropriate objectives and actions in order to achieve the preferred end–state.*

Critical to accepting this definition of EBO is an agreement that there is an intrinsic link between the strategic intent, end-state and Effects. The acceptance of this connection may seem rudimentary to the point of being unworthy of note, except that it is a decisive point as to whether the concept of EBO in this paper will be understood as it was intended. To begin the explanation, few would argue with the assertion that an Effect is considered to be the result of an action: cause and Effect. Further, it could be safely stated that any *intended* action is done for a purpose: an Objective. Essentially, that Objective is really an attempt to ensure that a *desired* Effect is produced. To be able to formulate that Objective it is argued that prior knowledge of, and a *desire* for, the resulting Effect is required. It is therefore suggested that the cause should not only result in an Effect on the basis of action, but that the desire for that Effect must help in determining both the action (cause) *and* the Objective as critical parts of a sum: the end-state. In this process, the Objective

A Jaguar of No 41 Squadron RAF on patrol over northern Iraq

The preferred end-state is achieved by successful action that in turn achieves the Objective(s)

should be seen as nothing more than a means to translate desired Effects into action so that the Effect(s) is achieved and ultimately the end-state. In the end, the value of Effect(s) in the whole process is really nothing more than the means to communicate the strategic intent (the intent being intrinsically linked the end-state). In conclusion, whilst Objectives and Effects are both means to an end, Effects must be identified before Objectives.

In terms of military operations, the strategic intent should be formulated and then described to the subordinate levels of command in terms of Effects. From that point, Objectives — at the operational level — should be established that support the desired Effects. It is important to note that this train of thought assumes one or more Objectives may be required to achieve an Effect. Tasks (or actions) are then derived at the tactical level based on the Objectives. Looking at it in reverse, the preferred end-state is achieved by successful action that in turn achieves the Objective(s). Tying it all together, the aggregate of the Objectives satisfies the desired Effects and the culmination of the desired Effects is the stratgic intent.

Allied troops in Fallujah

Without a clear strategic aim/intent that can be translated into action, the economy of effort is lost

A potential criticism of this line of thought that may be raised is that this explanation simply renamed what are currently known as Objectives and now calls them Effects. Not so. The critical difference between Effect and Objective in this sense is in terms of the Measurement Of Effectiveness (MOE). MOE is critical to all military plans: however it appears to be one area in which many militaries fail. The proposed difference is that Effect is command descriptive for the wide breadth of required action and Objectives are the measurable framework for those actions in order to provide MOE for the operation. For example, if the strategic intent is something like 'negate the global terrorist threat' and the desired strategic Effect is to '*marginalise* the appeal of terrorists to regional populations', then Objectives (coupled with tactical level Effects) should be formulated that attempt to do things such as disrupt recruiting, decrease retention and degrade the operational effectiveness of terrorist elements in order to produce measurable results to indicate achievement of the desired strategic Effect. Rationale for this distinction will be made when the Global War on Terror is discussed later.

A terrorist bomb destroys a bus killing many in London, July 2005

A prime example of a strategic aim/intent that must be supported by a new approach to operations is seen in the Global War on Terror (GWOT). Terror may be assessed as a threat to global security as it manifests in varying, yet equally serious forms, in most regions of the world

Effects Based planning

Selection and maintenance of the *aim* as a principle of war is crucial. Without a clear strategic aim/intent that can be translated into action, the economy of effort is lost. Further, it appears impossible to measure success or failure. Properly applied, EBO, and specifically the early identification of Effects, would allow for more comprehensive operational planning by providing a means to communicate guidance in concise, yet non-restrictive terms.

Objective-based planning processes were excellent at dealing with the world they were designed for with characteristics such as conventional manoeuvre forces, contained Area of Operations (AO), clear 'phasing' of operations, identifiable enemies and distinct roles for state and non-state actors. The reality faced when planning past operations was relatively simple. The approach of identifying Objectives and then achieving them worked well in the set-piece world. Then came failed states,

insurgency, religious fundamentalism, mass media, more lethal weapon systems, weapons of mass destruction, cheaper weapons, interest groups, Non-Government Organisations (NGOs) the Internet . . . *et cetera, et cetera*. The predictability and stability that characterised Cold War-era military operations is gone. Therefore, it is argued that there is a need to update the Operational Planning Process[12] based on the assertion that modern militaries cannot employ a planning process that compartmentalises the threat and, as a result their operations, into limited Objectives that are clearly defined by time and space.

A prime example of a strategic aim / intent that must be supported by a new approach to operations is seen in the Global War on Terror (GWOT). Terror may be assessed as threat to *global* security as it manifests in varying, yet equally serious forms, in most regions of the world. The ability to produce comprehensive Objectives as the primary means for command guidance in the GWOT seems inadequate due to the protracted nature of the threat. The same Objectives are not necessarily applicable or transferable between the various regionally based threats, not to mention they do little to deal with the trans-national threats. Formulating a sufficient number of Objectives appears to be so large a task as to be a worthless endeavour. The sheer number of strategic Objectives required to adequately address all the regionally based threats would make command of the GWOT too intensive to be effective. The solution would be economy of effort, especially in the early stages of plan development, to clarify the strategic aim / intent. Clear, concise communication of the strategic aim by identifying desired Effects (that are in turn translated into regionally based Objectives) would provide a more comprehensive approach to planning by achieving that greater economy of effort.

Effects Based C2

With respect to Command and Control (C2), it is argued that EBO, specifically in terms of the early identification of Effects, would provide a more effective command relationship than the current Objective-based approach. By identifying Effects as the starting point for plan development it would allow for centralised command in the plan development phase and decentralised execution of that plan beginning with the formulation of objectives. This command relationship would provide sufficient direction, but is not so rigid as to limit the freedom of action of subordinate commands. The command style is envisioned to be similar to the concept of Aufragstaktik.[13] This fluidity in command would become important in modern military operations that are of a highly complex nature[14] and would require quick operational transitions and / or simultaneous, but apparently disparate actions in the same area of operations such as articulated in General Krulak's (USMC) concept of the 3 Block War.[15]

Currently, there appears to be a critical piece of the puzzle missing in order to allow strategic command to effectively conduct EBO — what is an Effect? The USJFCOM On-line Glossary defines an Effect as:

'The physical, functional, or psychological outcome, event, or consequence that results from specific military or non-military actions'. The UK stance appears similar, yet their original paper stated *'there is no intention to produce an exhaustive list of Effects'*.[16]

Resolving the question as to what constitutes an Effect is seen as an imperative in the development of EBO, particularly in terms of increasing C2 familiarity and comfort with the concept. In fact, the potential problem created by a lack of clarity as to what is an Effect appears to go beyond the point of whether the C2 structure can become effective at EBO. It may not come down to the case of being able to identify the correct Effect the situation requires, but to identifying an Effect at all!

Whilst the British approach that avoids limiting potential Effects appears pertinent, a more precise definition as to what is an Effect, or better yet a list of criteria for something to be considered an Effect, similarly appears to be an imperative for both the development and conduct of EBO. Without this critical piece of the puzzle, the potential may be lost to provide appropriate strategic level command guidance as it would likely be characterised as being

Troops board an RAF C-17 flight to Pristina, Kosovo

Historically, many Western militaries have been good at deploying conventional, kinetic-type military power . . . What we have not done enough of, is to deploy adequate force-multiplying capabilities such as Human Intelligence (HUMINT) and Psychological Operations (PSYOPS) specialists

too broad to provide adequate direction or too provisional and prescriptive so as to appear as an Objective. Either way, in terms of C2, the concept of EBO would be rendered ineffective.

Effects based targeting

Historically, many Western militaries (for example Canada) have been good at deploying conventional, kinetic-type military power. As a result, we appear to have fallen into a trap. Regardless of the role (e.g. war-fighting, peacekeeping) the same troops are generally sent (for example Canada). What we have not done enough of, is to deploy *adequate* force-multiplying capabilities such as Human Intelligence (HUMINT) and Psychological Operations (PSYOPS) specialists.

Effects based targeting offers a more robust and realistic view of the inter-dependencies and relationships inherent in the modern battle-space. The 'new' way to think of targets is a massively complex problem to wrap one's mind around because it involves targeting the non-tangible

An F-117 releases a pair of Laser Guided Bombs

A reality of modern military operations, and arguably any modern power projection, is that expeditionary forces simply cannot deploy, blow things up and return home. Rather, an integrated approach to power projection, such as EBO, that employs all military capabilities, both kinetic and non-kinetic, in concert with all applicable national tools to project power and influence is the new reality

such as 'morale' and 'cohesion' versus buildings and tanks. In this proposal, effects based targeting means more than identifying an enemy Centre of Gravity (CoG) as being something like 'cohesion' in your orders and leaving it at that — you have to target that CoG with action. And, that action cannot be based on Objectives alone. In terms of targeting, the Objective based approach to targeting lends itself to the existence of a phenomenon akin to what Walter Lippmann called 'blind spots'[17], or a view of the world inconsistent with reality. The early identification of desired Effects would arguably create the mind-set required in order to understand complex realities of the modern AO. That is, an identified effect that is transferable across the entire AO (refer back to GWOT) and that allows for consideration of inter-dependencies and inter-relationships. This inclusive view can be expected to increase the overall effectiveness and capability of targeting.

This type of targeting is not new. However, it is a true and stark assertion that no modern Western military can categorically state that they are effective in this type of targeting. Air power and the increased accuracy of weapons, together with such capabilities as PSYOPS, deception operations (OPDEC) and the exploitation of HUMINT, have produced tunnel vision, and eschewed those other capabilities that may negate, supplant or support the use of kinetic force. It appears the reluctance to change or consider 'new' things (that have in reality been practiced since the beginning of war) is the problem. Part of our reluctance may be that by incorporating more 'non-traditional targets' the purpose for engaging a target, or the desired Effect, could also change and require us to wander into the relatively 'unknown'. It could be argued that it really isn't the unknown, but rather return to an old concept and a better way to accomplish what we are attempting to accomplish currently.[18]

Wrapping our heads around some potential strategic Effects such as 'convince', 'influence', 'persuade' or 'marginalise', especially in terms of 'weaponeering' and 'damage assessment' will take some time. EBO is put forth as the means to meld the two actions (kinetic and non-kinetic) together and allow for the more capable targeting. In the beginning, this will likely mean that non-kinetic and kinetic capabilities will each 'bite off' their piece of the Effect and formulate independent, yet hopefully co-ordinated, Objectives. However, as EBO becomes more familiar the level of integration in targeting between kinetic and non-kinetic is expected to increase. The obvious conclusion that many have come to is that eventually we wouldn't have non-kinetic or kinetic operations anymore, but rather EBO.

Conclusion

The ultimate value of EBO is that it may provide militaries with means to maintain pace as a relevant state tool for the projection of national power. This is not to say that militaries are expected to be marginalised anytime soon. However, with the modern day realities of shrinking budgets, limited manpower and tenuous public support for war, the call to arms in the historical sense (circa 20th Century) may be coming to an end for many nations. Some Western governments are changing the way they view geo-political situations and are considering alternate methods in an effort to project power and exert their influence. This shift may lead to a time when the military, in the conventional sense, ends up on the sidelines more often than not. A reality of modern military operations, and arguably any modern power projection, is that expeditionary forces simply cannot deploy, blow things up and return home. Rather, an integrated approach to power projection, such as EBO, that employs all military capabilities, both kinetic and non-kinetic, in concert with all applicable national tools to project power and influence is the new reality.[19]

There is an increasing urgency to define EBO. For many Western militaries, the impetus is the Provincial Reconstruction Team (PRT) concept. In Canada, we have arrived at that decisive point in that we are in the process of deploying a PRT to Afghanistan. Canada has never faced as task quite like PRTs, one that will require a high degree of co-ordination between kinetic and non-kinetic military action, and include the added complexity of incorporating non-military actors and actions in areas of diplomacy and development. The ability to translate the strategic intent into action will be paramount and EBO is arguably critical to the way forward.

[The opinions expressed are those of the author and do not reflect those of the Department of National Defence or the Government of Canada.]

Notes

1 United States. Joint Forces Command. On-Line Glossary. [cited 17 January 2005]. Available on-line: <http://www.jfcom.mil/about/glossary>

2 An operational planning process to conduct EBO within Rapid Decision Operations. EBP is results-based vice attrition-based. EBP closely mirrors the current joint planning process, yet focuses upon the linkage of actions to effects to objectives [my italics]. EBP changes the way we view the enemy, ourselves, and what is included and emphasized in the planning process. EBP uses a flexibly-structured battle rhythm that leverages a collaborative knowledge environment and capitalizes on the use of fewer

This type of targeting is not new. However, it is a true and stark assertion that no modern Western military can categorically state that they are effective in this type of targeting. Air power and the increased accuracy of weapons, together with such capabilities as PSYOPS, deception operations (OPDEC) and the exploitation of HUMINT, have produced tunnel vision, and eschewed those other capabilities that may negate, supplant or support the use of kinetic force. It appears the reluctance to change or consider 'new' things (that have in reality been practiced since the beginning of war) is the problem. Part of our reluctance may be that by incorporating more 'non-traditional targets' the purpose for engaging a target, or the desired Effect, could also change and require us to wander into the relatively 'unknown'. It could be argued that it really isn't the unknown, but rather return to an old concept and a better way to accomplish what we are attempting to accomplish currently.[18]

Wrapping our heads around some potential strategic Effects such as 'convince', 'influence', 'persuade' or 'marginalise', especially in terms of 'weaponeering' and 'damage assessment' will take some time. EBO is put forth as the means to meld the two actions (kinetic and non-kinetic) together and allow for the more capable targeting. In the beginning, this will likely mean that non-kinetic and kinetic capabilities will each 'bite off' their piece of the Effect and formulate independent, yet hopefully co-ordinated, Objectives. However, as EBO becomes more familiar the level of integration in targeting between kinetic and non-kinetic is expected to increase. The obvious conclusion that many have come to is that eventually we wouldn't have non-kinetic or kinetic operations anymore, but rather EBO.

Conclusion

The ultimate value of EBO is that it may provide militaries with means to maintain pace as a relevant state tool for the projection of national power. This is not to say that militaries are expected to be marginalised anytime soon. However, with the modern day realities of shrinking budgets, limited manpower and tenuous public support for war, the call to arms in the historical sense (circa 20th Century) may be coming to an end for many nations. Some Western governments are changing the way they view geo-political situations and are considering alternate methods in an effort to project power and exert their influence. This shift may lead to a time when the military, in the conventional sense, ends up on the sidelines more often than not. A reality of modern military operations, and arguably any modern power projection, is that expeditionary forces simply cannot deploy, blow things up and return home. Rather, an integrated approach to power projection, such as EBO, that employs all military capabilities, both kinetic and non-kinetic, in concert with all applicable national tools to project power and influence is the new reality.[19]

There is an increasing urgency to define EBO. For many Western militaries, the impetus is the Provincial Reconstruction Team (PRT) concept. In Canada, we have arrived at that decisive point in that we are in the process of deploying a PRT to Afghanistan. Canada has never faced as task quite like PRTs, one that will require a high degree of co-ordination between kinetic and non-kinetic military action, and include the added complexity of incorporating non-military actors and actions in areas of diplomacy and development. The ability to translate the strategic intent into action will be paramount and EBO is arguably critical to the way forward.

[The opinions expressed are those of the author and do not reflect those of the Department of National Defence or the Government of Canada.]

Notes

1 United States. Joint Forces Command. On-Line Glossary. [cited 17 January 2005]. Available on-line: <http://www.jfcom.mil/about/glossary>

2 An operational planning process to conduct EBO within Rapid Decision Operations. EBP is results-based vice attrition-based. EBP closely mirrors the current joint planning process, yet focuses upon the linkage of actions to effects to objectives [my italics]. EBP changes the way we view the enemy, ourselves, and what is included and emphasized in the planning process. EBP uses a flexibly-structured battle rhythm that leverages a collaborative knowledge environment and capitalizes on the use of fewer

formal joint boards. It employs virtual, near-simultaneous planning at all echelons of command. Ibid.

3 The focus of the targeting process is to produce COAs that will change the enemy's behaviours and compel him to comply with our will. The behavioural changes we attempt to create are the result of effects that flow from the employment of our lethal and non-lethal capabilities. Thus, effects-based targeting is distinguished by the ability to generate the type and extent of effects necessary to create outcomes that facilitate the realization of the commander's objectives. Ibid.

4 The coherent application of national and alliance elements of power through effects based processes to accomplish strategic objectives. Ibid.

5 For the purposes of this paper, although quite simplistic, the term non-kinetic should be considered all non-manoeuvre or supporting elements such as Intelligence and Information Operations. Kinetic should be taken to mean all manoeuvre elements such as infantry, armour, artillery as well as the applicable air and naval assets.

6 United Kingdom. Ministry of Defence. The UK View of Military Effects (Draft 1 * Level). 2004. p. 2

7 The UK View of Military Effects (Draft 1 * Level). p. 1

8 The UK View of Military Effects (Draft 1 * Level). p. 5

9 United Kingdom. Ministry of Defence. UK Military Effects-Based Operations-An Analytical Concept. (2005). p. 2.

10 Op Cit. p. 5

11 Op Cit. p. 7

12 The Canadian Forces (CF) Operational Planning Process, or OPP, resembles most Western military planning processes. The OPP is a coordinated staff process used by a commander to determine the best method of accomplishing assigned tasks and to direct the action necessary to accomplish the mission. It consists of 5 phases: Initiation, Orientation, COA Development, Plan Development and Plan Review. Canada. Department of National Defence. CF Operational Planning Process, B-GJ-005-200/FP-000.

13 Mission-oriented command, or what the Germans call 'Auftragstaktik' is a . . . leadership and command philosophy that demands decisions and action at the lowest level of command where there is an intimate knowledge of the situation and the commander's intention in beginning of an operation. The mission order is merely a technique that is used to implement and execute mission- oriented command. Lt Col John Silva, Aufragstaktik-It's Origin and Development, Infantry (Sep-Oct, 1999). p. 6-9 (excerpts). [cited 17 January 2005] Available on-line: <http://www.baltdefcol.pims.org/documents/bdcol_auftragstaktik.html>.

14 Paul Martin, the Prime Minster of Canada, stated that a 3-D approach — the integration of diplomacy, defence and development — will serve as the model for Canada's involvement in international crises in the future. Canada. Office of the Prime Minister. PM announces measures to support Canadian Forces abroad. News Release, (14 April 2004). [cited 20 January 2005] Available on-line: <http://pm.gc.ca/eng/news.asp?id=173>

15 'On October 10, 1997, General Krulak articulated his vision of the three-block war in a speech before the National Press Club. He predicted [that] in one moment in time, our service members will be feeding and clothing displaced refugees, providing humanitarian assistance. In the next moment, they will be holding two warring tribes apart - conducting peacekeeping operations — and, finally, they will be fighting a highly lethal mid-intensity battle — all on the same day . . . all within three city blocks.' Cited in Reuben E. Brigety's paper From Three to One: Rethinking the 'Three Block War' and Humanitarian Operations in Combat. Found on-line at http://atlas.usafa.af.mil/jscope/JSCOPE04/Brigety04.html. Cited 20 Jul 2005

16 Op. Cit. However, in an updated version of the same paper the statement is qualified by the additional comment that a list of more frequently applicable effects may be appropriate; an issue that will be investigated in the future.

17 For a discussion of the concept of 'blind spots' see Walter Lippmann. Public Opinion. New York: Free Press, 1965. Chap VIII.

18 The argument that this new type of targeting is essentially based on an older way of thinking refers to the many lessons identified and lost from Sun Tsu, Napoleon, Ghenghis Khan et al.

19 This is essentially the thrust of the UK's Effects Based Approach.

Servicing Commandos refuelling a Spitfire during Operation Overlord
Air Historical Branch (RAF)

Are the experiences of Servicing Commandos relevant today?

By Wg Cdr S D Ellard

In 1942, RAF aircraft maintenance units called Servicing Commandos were formed to provide a refuelling and rearming capability at recently captured enemy airfields. Selected aircraft technicians were given commando skills in order to operate under these demanding conditions. Drawing on archived documentation, unit histories and personal recollections, this paper explains the reasons for their formation, the role they were required to perform and their effectiveness during operations. The experiences of the Servicing Commandos are shown to be relevant today, as analysing their performance reveals enduring key success factors, which can be applied to enhance current RAF expeditionary operations.

The application of air power has always been dependent upon effective support on the ground. Whilst the dependence of military operations on logistic support is not unique to the air environment, ground support to air power nevertheless has some unique characteristics; it can be highly technical in nature and remote from the air battle and must therefore comprise personnel with the necessary skills and be responsive to the nature of air operations being undertaken. However, the true value of logistical support to air operations is often only appreciated when it fails to deliver, an example of which was the poor level of ground support provided to Royal Air Force (RAF) operations during the Battle of

France in 1940. During this phase of the War, the RAF was so short of fighter aircraft that an operational strategy was devised that would allow aircraft to be either operated in France or on the UK mainland.[1] The UK element of this strategy was provided by regular squadron ground crew, whilst the element in France was provided by Wing Servicing Echelons (sometimes termed Wing Servicing Flights), who were tasked with providing a forward refuelling and rearming capability.[2] However, the Wing Servicing Echelons were criticized for failing to deliver effective support under these operating conditions and could therefore not be relied upon in the future, where similar operational environments were envisaged. The result of post-operational analysis was the recommendation that formed units should be established to provide this support capability, which would need to possess strong esprit de corps, self sufficiency, be multi-skilled and be capable of operating under challenging operational conditions. Under the sponsorship of influential figures such as Mountbatten, Commodore Combined Operations, these units were subsequently formed and named the Servicing Commandos.

Drawing on archived documentation, unit histories and personal recollections, this paper explains the background to the formation of the Servicing Commandos and the role they were required to perform. The original Concept of Operations (CONOPS) for providing this capability is then described as well as detailing the training they received to meet this task. Their actual performance in subsequent operations is illustrated by accounts of their actions in support of action in North Africa during Operation Torch and landings in Normandy during Operation Overlord. In contrast, evidence of criticism of their title, CONOPS and utility at the operational level is also provided. Contemporary strategic analysis tools are then applied to gauge the effectiveness of their operations and assess the degree of strategic fit between their CONOPS and the operating environment. The product of this analysis is a list of enduring key success factors that remain relevant to the support of expeditionary air operations. The current RAF CONOPS for the support of expeditionary operations is then measured against these enduring key success factors in order to assess the strengths and weaknesses of the current system and identify measures that could enhance current or future performance.

The conclusion is reached that the Servicing Commandos supremely filled their primary role of supporting operations in the environment for which they were created. However, they were less successful when the operating environment did not match that envisaged, they did not fit within the regular RAF CONOPS and they failed to retain the support of senior RAF leaders. As a result, as soon as the requirement for their particular skills within the RAF no longer existed, they were promptly disbanded. Whilst the modern RAF CONOPS for expeditionary operational support embraces many of the key success factors identified by the experiences of the Servicing Commandos, there remains a doctrinally unfulfilled requirement to provide a forward arming and refuelling capability similar to that provided during the Second World War (WWII). Indeed, recent attempts to provide this capability on an ad-hoc basis during recent operations have failed due to deficiencies in ground crew force protection skills, which were the core capabilities of the Servicing Commandos. It is not proposed to reproduce a modern-day formed unit equivalent to the Servicing Commandos. However, the skills, capabilities and key success factors relevant during WWII can be applied to current first-line squadron ground crew units to provide an equivalent capability that embraces the strengths of the Servicing Commandos while avoiding the structural weaknesses that led to their swift disbandment. Therefore, the experiences of the Servicing Commandos are very relevant to current RAF expeditionary operations. Almost 60 years after the disbandment of the Servicing Commandos, the importance of esprit de corps, flexibility, training, self-sufficiency and the support of senior leadership remain enduring key success factors in support to modern expeditionary air operations.

Servicing Commandos arming a Typhoon during Operation Overlord
Air Historical Branch (RAF)

Aircraft maintenance strategies provided by dedicated squadron ground crew were not optimized for the full spectrum of air operations

The Servicing Commandos

The RAF quickly discovered during the early stages of WWII that conventional aircraft maintenance strategies provided by dedicated squadron ground crew were not optimized for the full spectrum of air operations. In particular, during the battle for France in Spring 1940, the need for efficient logistical and engineering support to maximize aircraft availability was acute. At this time, the RAF was 'so desperately short of fighters that a system had to be devised under which it was hoped that aircraft could be used alternatively in France or at Home'.[3] The CONOPS devised was for the fighters to be maintained at their home base in the UK, whilst specially formed Wing Servicing Flights/Echelons were established to provide a forward refuelling, re-armament and repair capability for aircraft in France. These CONOPS allowed aircraft to be used effectively in operations over France, yet their UK-basing meant that they were less vulnerable to German attack. However, the Wing Servicing Flights were ill prepared, ill trained and ill equipped and proved to be unsuccessful, due to flaws in their organisation.[4] The Commander in Chief Fighter Command, Air Chief Marshal Sir HCT Dowding, later wrote that these units were not very efficient[5] and Commodore Combined Operations, Mountbatten, expanded on this comment by noting that 'the difficulties of these servicing parties in the past has been a lack of esprit de corps, lack of training and lack of coordination'.[6] The RAF was not able to accept this state of affairs as future operations in N Africa,

A Typhoon taking off from a Landing Ground in Normandy
Air Historical Branch (RAF)

The Servicing Commandos would not be expected to fight for the airfields, but in the circumstances under which they would be operating, opposition could be expected and they would have to be prepared to defend themselves and their aircraft

Sicily, Italy, Normandy and the Far East envisaged similar forward maintenance of aircraft, away from their main operating bases and organic squadron ground crew. A more robust support solution was therefore sought. The RAF was quick to devise an improved strategy and worked closely with the Combined Operations Headquarters. In his letter to the Deputy Chief of the Air Staff, Director Fighter Operations proposed a more effective solution.[7] Key to his plans was the early operation from captured enemy airfields. This would involve:

Installing the essential minimum of communications, refuelling and re-arming equipment and personnel . . . It must be a very highly trained organisation, having high morale and esprit de corps . . . The desired result can probably be obtained by forming a number of Flight Servicing Units as permanent entities on the establishments of Fighter Groups. Because they are a permanent entity, they can be highly trained both in servicing aircraft and in the business of going in over the beaches or perhaps airborne to an advanced aerodrome. They obtain RAF esprit de corps by their association with the Group. They should obtain 'Combined Operations' esprit de corps by their thorough training, which they must inevitably be given for the purposes of going in over the beaches. (They should be 'RAF Commandos.')[8]

Mountbatten, Commodore Combined Operations, in his letter to the Chief of the Air Staff gave his strong support to these proposals, highlighting that 'although they would not do any direct

fighting if all went well, the very nature of their duties may involve them in tight corners and they will have to be taught to fight with a tommy-gun like the military commandos'.[9] He therefore also agreed that it would be 'best to call them 'Servicing Commandos' even if the title were slightly inappropriate'.[10] His strong support to the formation of these units led to his subsequent adoption of the title 'founder of the Servicing Commandos'.[11]

However, even at this early stage there was resistance among some senior RAF officers towards these units. Early criticism concentrated as much on the title 'Servicing Commando' as on the role they were to play or the type of training they would receive. Air Chief Marshal Dowding expressed his concern that a number of men with valuable technical skills were to be lost to 'Commando' work.[12] The Chief of the Air Staff, Air Chief Marshal Portal replied that the members of these units would 'need to be tough and able to hold their own in an emergency' and therefore needed to be trained in combined operations.[13] However, even Portal's support was not unlimited and he acknowledged Dowding's concern about 'locking up skilled men in these Servicing Commandos' and had 'made it clear that they are not necessarily a permanent feature of the RAF organisation, and may have to be disbanded when we find our temporary surplus of ground tradesmen disappearing'.[14] Assistant Chief of the Air Staff (Policy), Air Vice Marshal Slessor had similar reservations, commenting that:

I don't like the term 'Commando' in this connection; they are mobile servicing flights and no more. It's ridiculous if everyone who may ever be landed on the Continent has got to call himself a Commando. The RAF should be, and are, ready to serve anywhere in any circumstances without giving themselves fancy titles.[15]

Mountbatten would ultimately prevail with his view that 'to call them *Commandos* will go a long way to further their esprit de corps' and the first Servicing Commando Units were subsequently formed.[16] However, the resistance towards the Servicing Commandos would continue to haunt the units and ultimately lead to their eventual disbandment.

As plans progressed, the CONOPS of the Servicing Commandos became more clearly defined. Operations would take place in 5 stages.[17] In the first stage, aircraft would be flown from their home bases, perhaps with a forward station in the beach area. The second stage would follow as soon as the Army had seized an enemy airfield and the surface made fit for use by the Airfield Construction Branch.[18] Possibly concurrent with the second stage, the third stage would involve Servicing Commandos, their equipment and transport disembarking into landing craft and being put ashore on the beaches. They would then 'install the essential minimum of communications, set up fuel and ammunition dumps and sufficient equipment for refuelling, rearming, between flights and daily inspections, minor repairs and replacements and the necessary gear for aircraft pickets, ground marking, entrenching and cooking'.[19] The Servicing Commandos would not be expected to fight for the airfields, but in the circumstances under which they would be operating, opposition could be expected and they would have to be prepared to defend themselves and their aircraft.[20] No elements of the RAF Regiment were envisaged for force protection at this stage, as the Army would initially remain responsible for protection of the airfield once captured.[21] During the fourth stage, Servicing Commandos would support operations by servicing, rearming and refuelling aircraft at the forward aerodrome, while aircraft would remain based at their main airfield. This stage would continue until lines of communication had been established and the forward echelon of a squadron's personnel and equipment had arrived at the airfield.[22] The fifth stage would begin once all of the squadron's equipment, ground and flying personnel and aircraft had arrived and started full operations from the forward airfield. At this stage, the Servicing Commandos would withdraw and prepare to 'leapfrog' onto the next forward airfield.[23]

It was soon realised that not all RAF ground crew would be suitable for the type of missions

envisaged for the Servicing Commandos. Commandos would need to be willing, motivated volunteers and fit enough to withstand the demanding environment of their operations. In order to attract suitable recruits, SECRET memos were distributed to units requesting volunteers for the Servicing Commandos.[24] Notices appeared in station orders stating 'volunteers required for a dangerous task'.[25] Candidates were to be 'of A1 physique, of not more than 35 years' and of specified trades.[26] Commanding Officers were to interview candidates and only if they fulfilled all necessary criteria were they told of the duties they were likely to perform. Volunteers briefed on the role of the Servicing Commandos were warned not to discuss or pass on the information to service personnel or anyone else. In addition, due to the importance of the role they would undertake, commanding officers were told that they were not permitted to reject volunteers on the grounds that their loss could impair the smooth running of the unit.[27] This latter caveat was strictly observed and one volunteer recalls that even his Station Warrant Officer, dismayed that he was about to lose a valuable armourer, was unsuccessful in preventing his posting to the Servicing Commandos.[28] Many airmen, frustrated and bored with routine RAF support operations in the UK and seeking adventure, volunteered for the Commandos and the first units soon began their training.

While Unit Armourers were given instruction in various weapons, Fitters and Riggers were trained on these systems as well so that they could assist in weapon loading

Servicing Commandos relax, while armourers load bombs onto a Mustang of No 122 Squadron
Air Historical Branch (RAF)

Air Vice Marshal Slessor had complained that the 'RAF should be, and are, capable of serving anywhere in any circumstances'.[29] His sentiment closely matched that of Winston Churchill, who stated that 'it must be clearly understood by all ranks that they are expected to fight and die in the defence of their airfields'.[30] However, Slessor's vision of a RAF that was already capable of conducting operational support in testing conditions did not match the reality of the time. A former Servicing Commando recalls that during his basic training, RAF ground crew received a great deal of training in performing parade drill with .303 rifles, but spent little practice actually firing them and undertook practically no training in forming an effective defence against an airfield attack. They received no training in firing automatic weapons and were completely unprepared for participating in amphibious landings.[31] A training programme for the Servicing Commandos was therefore designed to dramatically reverse this shortfall. In order to foster cohesion and esprit de corps at the earliest opportunity, members of Servicing Commando Units started their training together as a formed unit as soon as they had been formed. One early change for Servicing Commandos during training was that their RAF blue tunics and trousers were replaced with Army-style khaki uniform, the only items that distinguished them from the Army were a RAF blue side cap, blue shoulder flashes and chevrons combined with a blue shirt.[32] Personal weapons included a mixture of rifles with bayonets, Sten guns, anti-tank rifles, revolvers, Tommy guns, Bren guns and grenades.[33] Initial instruction included infantry-style training from Army, RAF and RAF Regiment Officers and SNCOs and comprised weapons drill, marching, physical training, living in field conditions and swimming fully clothed with equipment and weapons. To reinforce this training, they camped in tents in nearby fields instead of living in standard RAF barrack rooms. All unit members were taught to drive by teams of civilian driving instructors, which encompassed instruction on all of the unit's vehicle types. Driver training was supplemented by practising driving in military convoy formation, which on occasions included convoy defence and mock air attacks.[34]

Air Historical Branch (RAF)

Upon successful graduation from the course at Inverary, Servicing Commandos were awarded the Special Combined Operations badge

Technical instruction was given on a variety of aircraft including Spitfires, Hurricanes, Typhoons, Kittyhawks, Tomahawks, Mosquitoes and Whirlwinds. Technicians were taught to be multi-skilled and engine and airframe fitters were expected to assist each other as one trade. While Unit Armourers were given instruction in various weapons, Fitters and Riggers were trained on these systems as well so that they could assist in weapon loading. Armourers were also trained in mine detection and mine and bomb disarming and disposal. All unit members received training in refuelling and rearming and even non-tradesmen (such as cooks and medics etc) were encouraged to help by transporting fuel and ammunition etc. In addition, the signals officer and signals staff received specialist training in VHF radios at RAF

Digby. The next stage of their training took place at the Combined Operations Training Centre at Inverary. This stage of training included lectures and demonstrations of weapons, army movements and naval vessels. They practised loading vehicles into various types of landing craft and rehearsed several beach landings. Numerous weapons firing sessions took place, during which all personnel fired each of the unit's various weapons, and included live firing exercises at night.[35]

Upon successful graduation from the course at Inverary, Servicing Commandos were awarded the Special Combined Operations badge. This resulted from a recommendation made by a Wing Commander Williams, who had been sent by the Senior Engineering Officer of Army Co-operation Command to observe Servicing Commando Training at Inverary in March 1943; he was 'struck by the tremendous moral effect a 'badge' would have'.[36] Further observations from his visit included a recommendation to supplement the establishment with an administrative officer, as the size of each Servicing Commando Unit had risen following the addition of further armament personnel and ground signals airmen. He also considered that the scale in arms, equipment and vehicles be increased to meet their task.[37] As a result, a typical Servicing Commando Unit at full strength rose to 187 men, three Warrant Officers and three Officers supported by one 5cwt Hillman Van, two 15cwt Commer Trucks and 12 three-ton trucks. Vehicles were specially fitted with equipment, tools and spares in waterproof steel bins for amphibious working, which could be removed and set up in airfields for operations.[38] Whilst their establishment may initially appear excessive, it must be remembered that their task was large and on occasions, Servicing Commando Units supported up to 184 sorties in a single day.

Having been trained and prepared for operations, there was an inevitable pause for Servicing Commandos between completion of their training and their actual employment on operational duties. There was no clear role for personnel trained to Commando status within routine RAF CONOPS, and Servicing Commandos were normally attached to regular RAF Units that operated the aircraft types that they were expected to support. For example, many members of No 3210 Servicing Commando Unit spent the period between October 1943 and June 1944 at RAF Friston (after completion of their Commando training at Inverary, and prior to their operational deployment in Normandy). Here, they continued to hone their technical aircraft skills, while at the same time maintaining their personal fitness and practicing infantry skills.[39] Although strikingly different from regular RAF ground crew due to their khaki uniforms, they were soon appreciated by the squadrons that received their extra support. Indeed, squadron commanders noticed significant rises in serviceability when supported by the Servicing Commandos, in one case rising from 80-85% up to 95-98%.[40] As a result, respect between the squadron aircrew and Servicing Commandos grew and their readiness for operations increased.

During WWII, Servicing Commando units were employed in a variety of operational theatres including N Africa, Sicily, Italy, Normandy and the Far East. To describe representatively their performance on operations, two campaigns have been chosen: North Africa and Normandy. These have been selected as they illustrate one example where the Servicing Commandos were utilized effectively, and earned great praise, and a further example where despite performing extremely well, their CONOPS were criticised for being less relevant. Accounts of their actions in both campaigns are described, followed by the post-operational assessment of their contributions by senior officers.

The first use of the Servicing Commandos took place in November 1942 in support of the invasion of North Africa under Operation Torch.[41] Two RAF Servicing Commando Units, Nos 3201 and 3202 sailed with the Eastern Task Force with the aim of taking over and defending key airfields immediately after capture by the army and to service aircraft as soon as possible. Despite being machine-gunned and strafed by enemy aircraft during the landing, 3201 and 3202 were able to disembark successfully and complete the 12-mile march to their initial airfield Maison Blanche.[42]

Weapons and equipment are brought ashore in North Africa during Operation Torch
Kellet & Davies (1989)

Despite being machine-gunned and strafed by enemy aircraft during the landing, 3201 and 3202 were able to disembark successfully and complete the 12-mile march to their initial airfield Maison Blanche

The advance parties found the initial Hurricane aircraft from No 43 Sqn waiting for them and they immediately set to work removing long-range petrol tanks and preparing them for operations. They were joined later that day by Spitfire aircraft from Nos 93, 111 and 242 Sqns. By late afternoon, they were at full strength and supported operations until late that night.[43] The first RAF amphibious landing had been carried out successfully and support to operations was in place. Over the next few days, the Servicing Commandos continued to re-arm, refuel and repair aircraft despite daily Luftwaffe bombing and strafing attacks. Anti-personnel devices and delayed actions bombs were dealt with by the units' armourers as there was no dedicated bomb disposal unit.[44] The units undertook the maintenance of more squadrons for a far longer period than intended, as there were difficulties in assembling the regular fighter squadron ground crew and equipment and moving them to the forward area to join their aircraft.[45] In the opinion of the Air Officer-in-charge of Administration at HQ Eastern Air Command, 'the success achieved by the fighter squadrons during this period was undoubtedly due very largely to the loyal and extremely hard work of the Servicing Commandos who have certainly proved their value in a

Servicing a Mustang during Operation Overlord
Air Historical Branch

Operation Overlord was the establishment of a foothold on the European Mainland at Normandy. Six Servicing Commando Units were involved in the operation, four of which went ashore on D-Day+1

campaign of this nature'.[46] As the operation progressed, the Servicing Commandos moved from Maison Blanche to support subsequent operations at Djidjelli, Souk el Arba, Bone and other airfields under very challenging conditions. The weather was poor, living conditions were basic, airfield and road surfaces were bad, supply was problematic and the servicing workload was high. During the advance, they serviced Spitfires, Hurricanes, Wellingtons and US Mitchells, often under enemy attack.[47] For example, having travelled the 400 miles to Souk el Arba to service aircraft of Nos 72 and 93 Squadrons in support of the advance on Tunis and Bizerta, No 3201 Servicing Commando Unit was observed by two enemy ME 109 aircraft. Putting their training into practice, they dug slit trenches and dispersed aircraft in anticipation of an attack, which followed shortly afterwards when the airfield came under attack from a dozen enemy ME109s and FW 190s. The attacks caused fires to petrol, oil and ammunition dumps and destroyed one aircraft and damaged six others. Two Servicing Commandos were killed, two badly wounded and four received slight wounds. One hour later, a formation of 10 Stukas attacked the base, followed by another wave of Stukas with fighter escort. Throughout these raids, servicing of aircraft continued and

repairs to fuel and ammunition dumps were carried out.[48] By the end of April 1943, Commando personnel had moved to a new airfield under construction near Medjez al Bab, less than eight miles from the front line. Here, in the last major effort in North Africa, the Servicing Commandos serviced 184 aircraft on 8 May alone. This was to be their last major contribution to the operation in North Africa and the units were then given refresher courses prior to subsequent action in Sicily in July.[49]

The work of the Servicing Commandos during this operation was viewed in extremely high regard. A report on the early stages of the operations in N Africa stated that 'the work performed by the Servicing Commandos was magnificent. Commanders of all units who came into contact with them were unstinted in their praise . . . They are the ideal maintenance organisation for forward airfields'.[50] Further praise came from a report by the Middle East News Service, which described their operations as follows:

This campaign was notable for the first employment of our Servicing Commandos. They are composed of highly skilled mechanics trained to fight — men with a spanner in one hand and a tommy gun in the other. One particular Commando maintained four fighter squadrons at a high rate of operations for approximately three weeks. The squadron and maintenance personnel working in the early stages on aerodromes deep in mud, in extremely primitive conditions, and with meagre supplies reaching them along slender lines of communication, showed infinite resource.[51]

The Servicing Commandos therefore seemed to have fulfilled Mountbatten's expectations when utilized in the role for which they had been formed and when the pace of operations matched the scenario for which their CONOPS were devised. However, when employed at Normandy in support of Operation Overlord, the pace of operations did not match those expected and the degree of strategic fit with the operating environment was achieved to a far lesser degree.

Operation Overlord was the establishment of a foothold on the European Mainland at Normandy. Six Servicing Commando Units were involved in the operation, four of which went ashore on D-Day+1. Royal Engineer Airfield Construction Units prepared forward airfields straight away and these were immediately manned by Servicing Commando Units.[52] The experience of No 3210 Servicing Commando Unit is typical of the events encountered by other units during this operation.[53] Landing in France at 11:00 hrs on D-Day+1, they immediately set off for their first objective, the airfield B3 at St Croix-sur Mer. Despite having lost two vehicles and the equipment within them to enemy fire, they were able to 'dig in' and set up operations. No members of the unit were lost during the landing. Operations began immediately, and they had the honour of receiving the first Allied aircraft to land in Normandy on 9 June. At this stage, one member of the unit, LAC Warren, was mentioned in despatches for his conduct during the landing.[54] The following week was intense. During the day, they continued to refuel, re-arm and repair aircraft, mainly Typhoons. Although not directly attacked by German ground forces, they were subjected to occasional air attacks by Luftwaffe aircraft and experienced artillery bombardments during the night. Ground crew learned to protect themselves by digging foxholes inside their tents and only one injury was sustained during this phase.[55]

One unexpected disappointment for the Servicing Commandos was that just prior to the invasion, they were told to hand in their khaki uniforms and ordered to wear their RAF blue-grey uniforms. This would later cause trouble as after a few days working in dirty, dusty conditions, their uniforms bore a striking resemblance to German uniforms and generated hostility amongst the local French population. With the resourcefulness for which RAF ground crew are renowned, they were soon able to 'acquire' replacement khaki uniforms and a more favourable dress situation was restored.[56]

On 15 June, the unit moved to another airfield B4 at Beny-sur-Mer, where flying operations continued despite being only several hundred yards from a German strong point being attacked by Allied ground forces. Relieved a few days later by regular squadron ground crew, 3210 then

Servicing Commandos rearming a Spitfire during Operation Overlord
Air Historical Branch

He had concerns about the over-emphasis of the assault aspect in the training of Servicing Commando personnel as despite being 'subject to shell fire and sniping Servicing Commando personnel have, in both the Sicily and "OVERLORD" operations, walked ashore…

moved to their next forward landing strip B9 at Lantheuil before moving forward once again on 30 June to B7 at Martragny. The unit received a commendatory letter from Air Commodore Montgomery and won praise from squadron commanders, yet the unit was disappointed that they had not worked to the intensity that they had expected.[57] As regular maintenance units had now 'caught up' with the progress of the invasion, 3210 were effectively redundant and were utilized in far more mundane work. They were subsequently employed in the repair and salvage of damaged aircraft at various airfields and the cannibalization of gliders in the Benouville district.[58] On 16 July, they moved forward to the airfield B12 at Ellon where they serviced Spitfires and Mustangs, initially under heavy shelling. However, the airfield became gradually quieter as the invasion stalled and on 28 July, the unit was given 48 hours notice to return to the United Kingdom.[59] The Commanding Officer of No 3210 Servicing Commando Unit reported that 'it can be said that the men carried out duties expected of them in a manner which does credit to the Unit, but it must

be recorded that they could have coped with at least three times the work and were disappointed that more could not be found for them'.[60] He added that 'the general feeling of the unit was of pride in having operated the first airfield on the continent, and of regret that they were unable to see the conclusion of the campaign'.[61]

The assessment of the performance of the Servicing Commandos at Normandy by senior engineering officers and operational commanders echoed these sentiments. In his report on the use of the Servicing Commandos in Operation Overlord, the Chief Engineer Officer 2nd Tactical Air Force, Group Captain Oisbury, stated his belief that the high technical qualifications of the Servicing Commandos were invaluable and that their contribution was absolutely essential during the early stages of the assault operations.[62] 'A large number of aircraft were made serviceable at the beachhead advanced landing grounds by the exchange of propellers, carburettors, constant speed units, flaps, rudders and many other such components, thus enabling aircraft to fly back to base and assisting the high rate of serviceability which existed during the assault period'.[63] However he summed up with the conclusion that although the Servicing Commandos were 'essential for the assault phase of the waterborne invasion', it was unnecessary to retain them once the wing personnel had landed and taken over the maintenance of their aircraft.[64] The Air Officer Commanding in Chief 2nd Tactical Air Force, Air Vice Marshal Elmhirst, in his covering letter suggested that 'the provision of six Servicing Commandos was extravagant and that three such units would have met the need of the Tactical Air Force'.[65] He considered that such tactical groups should be provided with refuelling and rearming parties, as they were 'a cheaper unit being less specialised'.[66] He had concerns about the over-emphasis of the assault aspect in the training of Servicing Commando personnel as despite being 'subject to shell fire and sniping Servicing Commando personnel have, in both the Sicily and "OVERLORD" operations, walked ashore . . . training in boat work, cliff scaling, skill at arms, etc, should be secondary'.[67] This latter criticism seems unfair, as it was only good fortune that conditions in Normandy were more benign than anticipated, a situation that could easily have been reversed. Nevertheless, the comments of the Air Officer Commanding in Chief 2nd Tactical Air Force were much more negative than those of the Chief Engineer and would impact on the future employment of the Servicing Commandos.

Therefore the reservations about the concept of the Servicing Commandos raised prior to their formation did not recede during the War. Despite the praise received after their initial engagement in N Africa, concerns continued to be voiced about their utility and senior officers queried whether the optimum organisation for supporting forward operations had been found. Even before Operation Overlord, on 27 August 1943, a meeting was held by the Vice Chief of the Air Staff, Air Officer Commanding in Chief Fighter Command, Air Officer Commanding North West African Tactical Air Force, Assistant Chief of the Air Staff (Policy), Director of War Organization and Director General of Organisation to discuss the future of the Servicing Commandos.[68] They agreed that the policy of Servicing Commandos was outmoded and should be abandoned. They did not criticize their performance on operations, but considered it more important that personnel with their training should be part of a recognized unit such as a Squadron Wing or Airfield Headquarters.[69] Director of War Organization was tasked to see how this could be reconciled with Operation Overlord requirements and he subsequently convened a meeting on 29 September 1943.[70] At this meeting as it was suggested that the name 'Commando' and the Combined Operations Badge were undesirable as it led to separatism, especially as all units in the 2nd Tactical Air Force were by then receiving field and assault training. However, it was concluded that there was insufficient time to disband the Servicing Commandos and transfer their vital function to Squadron Wings in time for Operation Overlord. Furthermore, they realized that the effect of removing the 'Commando' name and Combined Operations Badge would be detrimental.[71] As a result, the Servicing Commandos continued in their existing form and were able to deploy during Operation Overlord.

These previous exchanges explain the negative tone expressed by the Air Officer Commanding 2nd Tactical Air Force when he commented on the performance of the Servicing Commandos during Operation Overlord. Indeed, his recommendation at that stage could have led to the disbandment of the Servicing Commandos, had it not been for the paper written by the Director of War Organization on 8 August 1944 highlighting the requirement to 'retain surplus Servicing Commando Units intact in the UK for future use in the war against Japan'.[72] However, upon their return from the Far East, the final Servicing Commando Units were disbanded as no future roles for their capabilities were envisaged.

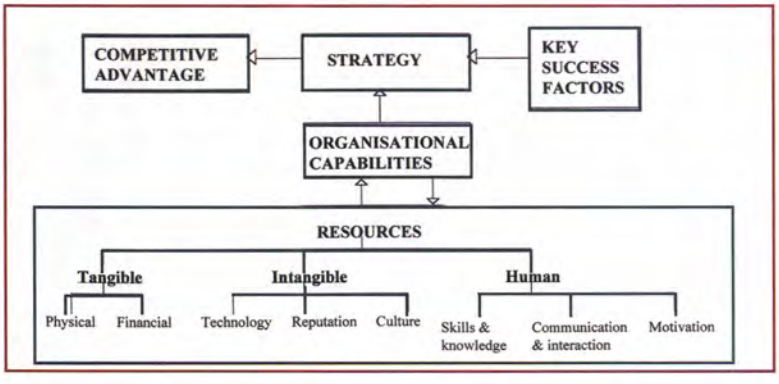
Analysis of the Performance of the servicing commandos

The effectiveness of the Servicing Commandos will now be analysed using contemporary strategic analysis techniques. A model by Grant is chosen as it links resources, capabilities and key success factors as well as emphasizing the importance of strategic fit to the operating environment and promoting the significance of competitive advantage; the goal of any successful strategy.[73] The aim of this section is to identify enduring key success factors that remain relevant to the support of modern RAF expeditionary air operations.

Resourses, capabilities and competitive advantage (After Grant, 1995)

Grant identifies organizational capabilities as being made up of tangible resources, intangible resources and human resources.[74] In terms of tangible resources, the Servicing Commandos were equipped with sufficient tools, vehicles, radios and armaments for their task and were well provisioned in consumables such as spares, fuel, bombs, ammunitions and food. Their role was vital and was therefore financed for the scenarios they were likely to encounter. Amongst intangible resources, the Servicing Commandos possessed outstanding esprit de corps. Having completed their training together and prepared themselves for operations they were a close-knit, highly bonded unit, with a strong sense of identity. They were the fittest, most capable and most highly trained technicians within the RAF and were justifiably proud of their role and reputation.

The early success of Servicing Commandos enhanced their sense of identity and reputation for providing high quality support in the most demanding environments. The simple measure of their Combined Operations badge and 'Commando' status further embedded this culture. When analysing human resources, it is notable that the Servicing Commandos were drawn exclusively from volunteers, were highly motivated and hungry for success. They received intensive training in all essential disciplines ranging from infantry skills to technical maintenance skills. As they were a relatively small sized, self-contained unit, they knew each other intimately and were therefore able to communicate well, avoiding communication barriers of hierarchy.



All necessary resource and capability requirements were therefore in place.

Grant defines Key Success Factors as the prerequisites for success.[75] For the Servicing Commandos technical and infantry skills and the right kit were clear success factors, achieved by their intense training programme and equipment establishment. Their numbers had to be as low as possible, realized by multi-skilling and self-sufficiency. In addition, esprit de corps and cohesion were vital to their success, attained by their formed unit identity and collective training. They were flexible and mobile and thus able to support operations in unfamiliar and demanding environments. Finally, their strategy could be realized as they had the support and backing of senior leadership figures, initially provided by the sponsorship of Commodore Combined Operations, Mountbatten.

The ultimate aim of any strategy is to achieve competitive advantage. Competitive advantage in this context is the superiority of the Servicing Commando strategy over alternative strategies available to provide the forward refuelling and rearming capability under demanding operational conditions. In this case, the alternatives were the use of the 1940 Servicing Echelons model or the employment of regular squadron ground crew. In comparison to the Servicing Echelons, the Servicing Commandos had a clear competitive advantage due to their sense of identity, cohesion and esprit de corps. Similarly, they possessed a competitive advantage over regular squadron ground crew as they had far superior technical and infantry skills, which were essential to be effective and self-sufficient in a hostile environment.

The resources and capabilities of the Servicing Commandos therefore gave them a clear competitive advantage over the alternative support models proposed at the time. Achievement of competitive advantage, however, is a necessary but not sufficient prerequisite for a winning strategy. Grant also identifies the achievement of strategic fit as critical for strategic success.[76] The concept of strategic fit describes the compatibility between a strategy and the strategic environment; a strategy may be well formulated, but will nevertheless fail if it fails to take into account the environment in which it is intended to operate. The Servicing Commando strategy assumed the strategic environment of a fast-tempo operation where airfields were regularly captured as ground forces rapidly advanced. This strategic environment was present in North Africa, where the Servicing Commandos were able to advance to new airfields after only a short period as soon as regular squadron ground crew caught up with them.

Strategic fit was therefore achieved and their performance deemed a total success. However, the strategic environment during the Normandy invasion was very different. After initial success during the first few weeks, the ground advance stalled, regular squadron ground crew caught up with the Servicing Commandos and there were no further airfields to which the Servicing Commandos could 'leapfrog'. The Servicing Commandos were then redundant and (mis) employed on 'odd jobs' before being repatriated with a sense of disappointment. Strategic fit was therefore not achieved in this case and their performance criticized.

The Servicing Commandos were trained and equipped for a specific task within a specific environment; when the actual strategic environment did not match the anticipated strategic environment, their value was greatly reduced. Furthermore, the transfer of Mountbatten from Director of Combined Operations to Supreme Allied Commander to South East Asia in 1943 meant that a key success factor had been lost. When analysed from the viewpoint of strategic fit and loss of key success factors, their rapid disbandment was inevitable.

The preceding analysis identifies five key success factors that are relevant not only to the operational environment of WWII, but have enduring value. Of prime importance is the continued importance of esprit de corps, cohesion and sense of identity to a military unit expected to operate under hostile conditions. Secondly, units need to be agile and flexible and be able to respond to changes in the strategic environment and thus achieve strategic

RAF ground crew repair a damaged engine compressor during Operation TELIC in 2003
Headquarters Strike Command Corporate Communications

During Operation TELIC in 2003 . . . insufficient air-to-air refuelling assets forced aircraft to return to base for refuelling and turn-round maintenance, often before they had had the opportunity to deploy their weapons

fit; units that can only perform specific tasks under specific circumstances are inherently weak. Thirdly, the importance of proper training and equipment is vital. Fourthly, personnel need to be multi-skilled and self-sufficient in order to ensure that the size of the unit is reduced to the minimum possible. Finally, support from senior leadership figures is fundamental, without which even the most successful strategy will be undermined. The degree to which these enduring key success factors are applied today is now analysed by assessing current technical support to modern RAF expeditionary air operations.

The relevance of the servicing commandos to current RAF CONOPS for support to expeditionary air operations

Throughout the Cold War, maintenance support to fixed wing, fast jet aircraft was primarily centred on fixed bases utilizing hardened aircraft shelters.

During this period, there were few operations that necessitated the type of support offered by the RAF Servicing Commandos during WWII. However, since 1989, the RAF has been increasingly engaged in expeditionary operations, where operations are conducted from unfamiliar airfields, in remote locations, far from organic support structures and under enemy attack. This shift in strategic context has demanded a corresponding change in the support strategy for this demanding type of operations. Guidance for the Air Operations Logistic Doctrine and the Air Logistic Concept of Operations is contained within Air Publication 100C-72. This publication explains that Deployed Operations Bases (DOBs) are supported by transferring into the operational theatre the minimum amount of maintenance support, manpower and equipment necessary to sustain the operation. To supplement squadron ground crew, Air Combat Service Support Units (ACSSU) have been formed in order to provide specialist skills beyond those of formed unit support staff. ACSSUs offer a variety of functions. For example, Tactical Armament Squadron provides a specialist expeditionary armament capability, whilst Tactical Communications Wing provides communication and information systems and tactical air traffic control services necessary to support deployed air operations.[77] While a forward rotors turnround and refuelling capability is provided to the helicopter force by Tactical Supply Wing, there is no doctrinal provision for a similar function for fast jet, fixed wing aircraft detached from their DOB.[78]

The majority of recent expeditionary air operations have relied on fixed wing, fast jet aircraft being able to reach their objectives by utilizing air-to-air refuelling and have therefore rarely demanded a forward arming or refuelling capability. Nevertheless, the Commanding Officer of the Joint Force Air Component Headquarters identifies the support of vertical short take off and landing aircraft from aircraft carriers as a relevant operational scenario that could require the provision of a fixed wing, fast jet forward rearming and refuelling capability.[79] A landing weight restriction on this type of aircraft means that aircraft laden with heavy weapons are unable to land back on the aircraft carrier. Operations are thus far more flexible if aircraft support can be supplemented by a shore-based, forward arming and refuelling facility, whilst maintenance and deeper organic support take place afloat. He further claims that the availability of sufficient air-to-air refuelling assets cannot be guaranteed for all future expeditionary air operations.[80] One recent operational example supports his reservations. The Senior Engineering Officer of the RAF Harrier force operating from Kuwait during Operation TELIC in 2003, recalls a period of operations when insufficient air-to-air refuelling assets forced aircraft to return to base for refuelling and turn-round maintenance, often before they had had the opportunity to deploy their weapons.[81] To enhance operational effectiveness, it was proposed to establish a forward first-line maintenance and refuelling facility at a recently captured Iraqi airbase at Talil in Southern Iraq. Here, the minimum number of ground crew, tools and equipment required would have deployed to Talil and utilized a transport C-130 Hercules aircraft as a refuelling platform in order to return Harrier aircraft to operations in the shortest time possible, therefore avoiding the requirement to return to the DOB in Kuwait. Although the CONOPS were considered viable and sufficient technicians, tools and equipment were available, the proposed deployment to Talil did not take place because of concerns regarding the level of force protection that could be provided. The ground crew had the right technical skills, but were not self-sufficient enough to defend themselves and their aircraft. They were therefore reliant upon specialist force protection skills from the RAF Regiment that could not be made available in time.[82] This recent scenario is very similar to the circumstances for which the Servicing Commandos were formed during WWII, yet because of inadequate skills and a lack of self-sufficiency, the potential operational advantage could not be realized. On this occasion, RAF ground crew were once again unable to meet Slessor's vision of the RAF being 'capable of serving anywhere in any circumstances'.[83]

The experience from Op TELIC and the potential operational scenarios envisaged by the Commanding Officer of the Joint Force Air Component Headquarters therefore suggest that

RAF ground crew service a Tornado GR4 during Operation TELIC in 2003
Author's Personal Collection

Perhaps the most pragmatic option would be similar to that proposed by Director General of Organisation in 1943; providing a forward arming and refuelling capability with a recognized formed unit such as first line squadron ground crew

future expeditionary air operations could require the same type of support capability provided by the RAF Servicing Commandos during WWII. A capability similar to that provided to the helicopter force by Tactical Supply Wing is thus required for fast jet, fixed wing aircraft. The RAF has provided this function in peacetime. During the 1990s, a Tornado Turn Round Flight was established in Scotland to refuel Germany-based Tornado aircraft conducting low-level flying training in Scotland. However, there currently exists no formal doctrine to support these scenarios under demanding operational conditions and exercises are not regularly carried out to practice these skills. In order to fill this capability gap, an appropriate manning structure and the necessary skills need to be identified.

Three potential manning structures are available to meet this task. One solution would be to form an ad-hoc unformed unit made up of engineering personnel from various RAF units whenever the capability is required. However, such a unit would not possess the vital *esprit de corps*,

RAF ground crew load an ALARM missile during Operation TELIC in 2003
Headquarters Strike Command Corporate Communications

In contrast to the majority of RAF ground crew during WWII, all current ground crew in the modern RAF are volunteers, physically fit and possess highly capable technical skills

cohesion and sense of identity, identified in the preceding analysis as a necessary key success factor. A second option would be to create an addition ACSSU, specifically trained to provide this capability. Such an ACSSU would be very similar to the solution adopted by the Servicing Commandos, would be an ideal unit to meet the demand when required, and would possess the necessary capabilities, *esprit de corps*, cohesion and sense of identity. Unfortunately, such a solution would also share the same structural weaknesses that generated resistance to the Servicing Commandos and led to their disbandment; they would be tailored to provide support only under specific operational circumstances, would offer little utility when not engaged in such narrowly defined operations and would be an expensive overhead to maintain during peacetime operations. Perhaps the most pragmatic option would be similar to that proposed by Director General of Organisation in 1943; providing a forward arming and refuelling capability with a recognized formed unit such as first line squadron ground crew.[84] This solution offers the most appropriate skill

RAF ground crew load a Stormshadow missile during Operation TELIC 2003
Headquarters Strike Command Corporate Communications

The provision of a fixed wing, fast jet forward arming and refuelling capability may well be an area that officers commanding forward support wings in the future will wish to consider, thus meeting the final key success factor of senior leadership support

set, yet retains the formed unit esprit de corps and offers the advantage of offering full utility during peacetime and when not engaged on this particular type of support to operations. All of the advantages of the Servicing Commandos would be potentially retained, the weaknesses that led to their rapid disbandment would be avoided, and the key success factors of esprit de corps and flexibility would be achieved. The need for 'fancy titles', that aroused so much hostility during WWII, would also be avoided.

However, the lesson from the attempt by the Harrier force to operate from Talil in 2003 has shown that if the first line squadron ground crew structure is adopted to provide this capability, then additional skills would be required in order to fulfil the enduring key success factors of training and self-sufficiency. In contrast to the majority of RAF ground crew during WWII, all current ground crew in the modern RAF are volunteers, physically fit and possess highly capable technical skills. Ground crew are now multi-skilled by

technical trade, enabling a reduction in the size of the logistical footprint required on operations.

In addition, all ground crew personnel receive annual training in basic field skills and weapons firing drill. However, the field and weapons skills possessed by current RAF ground crew are insufficient for them to be totally self reliant in terms of self defence. In contrast to the Servicing Commandos, they are unable to defend forward operations on an airfield effectively without specialist force protection support from the RAF Regiment. Determining the level of force protection required is a function of risk. Whilst Servicing Commandos in WWII were able to take the risk of defending themselves and their aircraft with relatively small numbers, the operational context of modern operations has now changed. Due to greater media exposure and a reduced domestic tolerance of casualties, the strategic consequences of losing aircraft and personnel to the enemy on the ground are far greater today than during WWII and a higher priority is now placed on force protection. However, experience in Talil has also shown that total reliance on the full support of specialist force protection offered by the RAF Regiment cannot be guaranteed and even if such support were to be available, the ground footprint would be excessive. Enhanced force protection skills for first line ground crew would reduce this dilemma. If, however, supplementary support from the RAF Regiment is assessed as necessary, then reductions in the manning footprint could be achieved by training RAF Regiment personnel in ground crew activities that require little technical skills such as assisting squadron armourers in the manual aspects of weapon loading. The addition of an RAF Regiment SNCO to the squadron manning would provide the means for delivering the enhanced training necessary, co-ordinating force protection during operations and liaising with any RAF Regiment staff assigned to assist.

The additional skills identified above would impose a significant training burden. However, not all squadron ground crew would require this level of training. Experience suggests that only up to 15-20% of first line ground crew would be required to fulfil this task, resulting in the formation of a small cadre of personnel needed to perform this task. The maintenance of such a capability would require regular practice. As a result of their experiences in Talil, the Harrier force is currently leading the way in preparation for such operations, and other aircraft platforms could learn much from their experience and from the support provided to the helicopter force by Tactical Supply Wing. The provision of logistic support to air operations is currently undergoing a transformation as a result of a recent End-to-End logistics review, resulting in a focus on the forward elements of logistical support. The provision of a fixed wing, fast jet forward arming and refuelling capability may well be an area that officers commanding forward support wings in the future will wish to consider, thus meeting the final key success factor of senior leadership support.

Conclusion

This paper has therefore shown that just as air operations must be flexible, agile and quick to react to changing operational environments, so must the ground support structure that is put in place to facilitate these operations. The RAF was ill prepared to support the type of operations that took place during the Battle of France in 1940, but quickly remedied this deficiency by the formation of the Servicing Commandos. The capability offered by the Servicing Commandos was tailored to solve a precise set of circumstances, and when these situations were reproduced, the results were outstanding. All essential elements of the strategy were identified: high quality, motivated servicemen were recruited; suitable and effective training identified and delivered; fit for purpose tools and equipment provided; and incredible esprit de corps, cohesion and sense of identity established. Despite the opposition of those who disliked their name and function, the Servicing Commandos became established and adopted an influential figurehead as their founding father in Mountbatten, Commodore Combined Operations. The rationale for the formation of the Servicing Commandos seemed to have been proved during their successful use in operations in North Africa. The value of their training and formed unit identity was demonstrated under demanding

conditions and they justifiably received great praise for their work. However, the Servicing Commandos were able to operate with such apparent success only because the operational context so closely matched the anticipated environment for which they had been formed and trained. As campaigns progressed, despite performing magnificently, the value of their efforts at the operational level was diminished, because the operational environment did not offer them the opportunity to demonstrate their full capabilities. This was typified by the experience at Normandy where, having quickly and effectively established support to air operations on the European Mainland, Servicing Commandos were quickly caught up by regular squadron ground crew and became redundant. No doubt, had British forces been able to maintain the anticipated fast pace across Northern Europe, and the requirement to regularly 'leapfrog' to forward air bases continued, then the Servicing Commandos would have been able to prove their worth. Criticism of the Servicing Commando's CONOPS and separatist identity followed and as soon as the war in the Far East was over, led to their prompt disbandment.

More suited to the RAF Servicing Commandos CONOPS was the rapid progress made by American forces following the Normandy invasion, which must have required an equivalent means of ground support to air operations. Whilst this paper has focused on a historical RAF example of support to expeditionary air operations and contrasted it with current RAF support strategies, further research could include studies of how ground technical and logistical support was provided to US air forces as they advanced through France and Germany and contrasting this with current US CONOPS. Other relevant areas of research could include analysis of the methods adopted by the German Luftwaffe to support rapid advances into France and Russia during earlier stages of WWII.

During the Cold War, there was little requirement for the type of support offered by the Servicing Commandos. However, it has been shown that there is now a potential requirement for the provision of forward arming and refuelling capability, currently doctrinally unfulfilled and practically highlighted during the failed attempt to operate Harrier aircraft from Talil during Operation TELIC in 2003. It does not follow that the Servicing Commandos should be reformed to meet this need; it is the provision of the capability that is required, not the duplication of a unit structure and CONOPS. Fundamental to the provision of this capability are 5 key success factors that are common to both the experiences of the Servicing Commandos and the current technical and logistical requirements of the RAF. The importance of esprit de corps, operational agility, training, self-sufficiency and senior leadership support link current RAF ground crew with the Servicing Commandos in WWII. Whilst this paper has offered the opinion that training a suitable proportion of first line squadron ground crew presents the most suitable solution to meeting this capability gap, the challenge for those who may be called upon to meet this requirement will be the need to secure the resources necessary for training and exercises and ensure that these 5 key success factors are met. The experiences of the Servicing Commandos in WWII have led the way in providing this form of support and their experiences are therefore most relevant to the support of current RAF expeditionary operations.

Notes:

1 The National Archives AIR 2/8193, Air Chief Marshal Sir HCT Dowding to Air Chief Marshal Sir CFA Portal dated 28 February 1942.
2 AP3397, p. 56.
3 The National Archives AIR 2/8193, Air Chief Marshal Sir HCT Dowding to Air Chief Marshal Sir CFA Portal dated 28 February 1942.
4 AP3397, p. 57.
5 The National Archives AIR 2/8193, Air Chief Marshal Sir HCT Dowding to Air Chief Marshal Sir CFA Portal dated 28 February 1942.
6 Air Historical Branch, A 2/101 Commodore Combined Operations to Chief of the Air Staff dated 25 January 1942.
7 The National Archives AIR 2/8193 DFOps to ACAS 15 Jan 1942.
8 Id.
9 Air Historical Branch, A 2/101 Commodore Combined Operations to Chief of the Air Staff dated 25 January 1942.
10 Id.
11 Kellet & Davies (1989), p. iv.
12 The National Archives AIR 2/8193, Air Chief Marshal Sir HCT Dowding to Air Chief Marshal Sir CFA Portal dated 28 February 1942.

13 The National Archives AIR 2/8193, Air Chief Marshal Sir CFA Portal to Air Chief Marshal Sir HCT Dowding dated 13 March 1942.
14 Id.
15 The National Archives AIR 2/7706 M10 ACAS(P) to DMC dated 2 May 1942.
16 Air Historical Branch, A 2/101 Commodore Combined Operations to Chief of the Air Staff dated 25 January 1942.
17 The National Archives AIR 2/8193, DFOps to ACAS dated 15 January 1942.
18 Id.
19 AP3397, p. 516.
20 Id.
21 The National Archives AIR 2/7706 M12 DFOps to ACAS(P) dated 4 May 1942.
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23 Id.
24 The National Archives AIR39/72, Volunteers for Servicing Commandos dated 30 June 1942.
25 Atkinson (2004), p. 56.
26 The National Archives AIR39/72, Volunteers for Servicing Commandos dated 30 June 1942.
27 Id.
28 LAC McQuillan, in an interview with the author on 17 December 2004.
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30 Quoted in AP 3000, p. 2.9.1.
31 LAC McQuillan, in an interview with the author on 17 December 2004.
32 Grainger (1995), p. 12.
33 Ibid., p. 13.
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37 The National Archives AIR 39/119, Report on Servicing Commando Course dated 3 April 1943.
38 Grainger (1995), p. 14.
39 LAC McQuillan, in an interview with the author on 17 December 2004.
40 Grainger (1995), p. 25.
41 AP 3397, p. 517.
42 White (2002), p. 28.
43 Kellet & Davies (1989), p. 11.
44 White (2002), p. 28.
45 AP3397, p. 517.
46 Id.
47 Id.
48 Kellet & Davies (1989), p. 14.
49 AP3397, p. 517.
50 Quoted in The National Archives, AIR 20/4372 E105A The Servicing Commando.
51 The National Archives AIR 20/4372, RAF Middle East News Service Air Ministry Bulletin No.9507 dated 22 Jan 1943.
52 White (2000), p. 28.
53 Kellet & Davies (1989), pp. 93-97.
54 Ibid., pp. 93-94.
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56 Id.
57 Kellet & Davies (1989), p. 94.
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67 Id.
68 The National Archives Air 20/4602, Record of Meeting to discuss Servicing Commandos dated 28 August 1943.
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70 The National Archives Air 2/7706, Memorandum on Servicing Commandos in Tactical Air Force dated 1 October 1943.
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76 Ibid., p.16.
77 AP100C-72, pp. 1-26 – 1-27.
78 Ibid., p. 1-28.
79 Group Captain Teakle, in an interview with the author on 20 January 2005.
80 Id.
81 Wing Commander Wilcock, in an interview with the author 8 March 2005.
82 Id.
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Signaal
Believed by many to be the greatest fighter pilot in history, Werner Mölders combined superb flying skills with exceptional leadership abilities
Een der meest succesvolle vliegeniers:
luitenant-kolonel
Mölders

The Culture of the World War II Luftwaffe Fighter Ace

By Wg Cdr Dean Andrew

By a convention established in the First World War a fighter pilot with five kills became an ace. In the Second World War the same standard was used by the Allies, whilst the Luftwaffe adopted the term Experte. Experten had to demonstrate overall proficiency in combat rather than attain a set number of victories. This method allowed comparative awards to be made to airmen flying different types, in different roles and operating in differing theatres. The nomenclature of the Luftwaffe system disguises the incredible results achieved by its fighter pilots (Jagdflieger). Any Allied pilot who achieved over 60 kills was regarded as exceptional, yet when Jagdflieger records became available after the War, they were totally eclipsed by the performance of the Luftwaffe fighter pilots. Applying the 'Allied' convention, the Germans had over 2,500 'aces' and, at the higher end of the scale, just 35 pilots were credited with a total of 6,848 kills — an average of 196.[1] Some fought from 1936 with the Legion Kondor in Spain until the final air battles over southern Germany and Austria in May 1945. Most had been shot down more than once (Erich Hartmann, the highest scoring ace with 352 victories, was shot down eight times) and many suffered serious injuries. But despite the deteriorating odds faced by the Jagdflieger as the War progressed and the contradicting and often illogical direction from the Nazi hierarchy — they flew on with pride and determination.

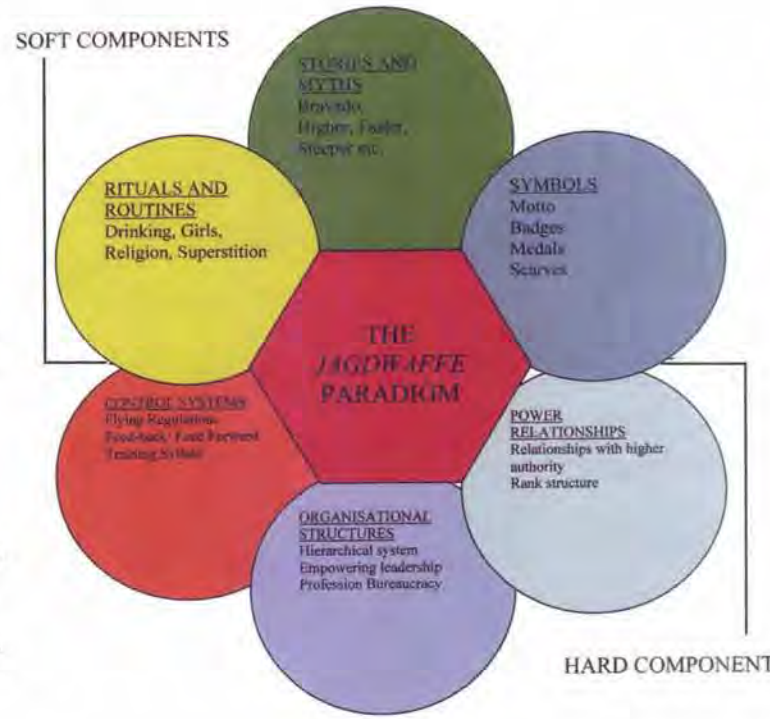
Modern corporate strategic thinking addresses how organisations achieve and sustain superior performance. Organisational features, such as structures, systems and power configuration are considered to be capabilities, which may be unique and provide a source of competitive advantage. Further to that, it is agreed that contextual relationships between such features define the culture of an organisation. Modern theory suggests that strong culture is a powerful capability that can generate advantage even when an organisation lacks the tangible resources of its rivals.[2] The subject of strategic culture matters deeply because it raises the core questions about the roots of, and influences upon, strategic behaviour;[3] and contemporary social science and business academics have tried to identify ways of exploiting the corporate or strategic culture of organisations for competitive advantage.

Defining culture is challenging. Deal and Kennedy[4] suggest that organisational culture is 'the way we do things around here'. Although this popular definition is appealingly straightforward, it is difficult to know what to include in such an idea of culture. A more structured approach, introduced by Johnson[5], is to consider contextual influences as parts of a web. The web tries to make sense of the myriad of internal structures and processes that arise from, and continuously reinforce, an organisation's view of itself. The web influences individual members' self-perception, as well as their internal organisation and external environment. This he terms the cultural paradigm. The constituent parts of the web, and therefore the paradigm, will be unique to each organisation.

This paper will turn Johnson's contemporary 'Cultural Web' model back to the Second World War and apply it to the Jagdflieger. It will show that these pilots were influenced by a web contributing a source of advantage that compensated in several ways for many of the material and intangible inadequacies with which they operated.

The cultural web

Johnson's Web is made up of six parts, the interplay between which characterises the organisation and defines the paradigm. The Jagdflieger Web below gives a snapshot of the inputs that could influence the paradigm. Most organisations have defined control systems and recognised structures and indeed a great deal has already been written by historians on these aspects of the Jagdflieger, but the cultural 'glue' of the organisation that holds the hard components together are the informal, soft components and the meanings they carry.



Starting with the more easily comprehended 'hard' components, this paper will identify the mechanisms that define the Jagdwaffe (Fighter-force) paradigm and establish how its strategic culture became a source of competitive advantage.

Organisational structures

Most organisations identify structure by use of wiring-diagrams, but structure defines more than just who is working for whom. There is a recognised inter-relationship between structure

and culture.[6] Modern business academics accept that hierarchical organisations, with many levels of power, often suffer poor internal communications and can be slow to react to crises. Flatter organisations, with fewer levels of leadership, that push power to as low a level as possible are conversely associated with efficiency and strong culture.

communications specialists and radar controllers associated with air defence units. For the majority of the War, Divisions were commanded by generals with First World War experience. Front-line pilots felt that direction from the Divisions was often out of touch with the realities of modern warfare, but there was little that could be done to rectify the situation.

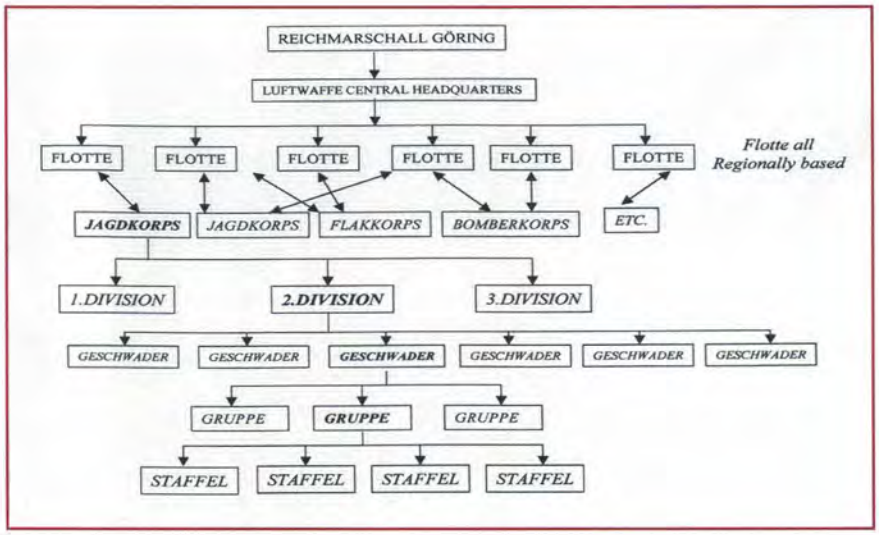


Fig 1: The Luftwaffe Air Organisation 1940

At the start of the War the Luftwaffe was divided into six territorial commands or Flotten, administratively responsible for all units, regardless of type or role, within its area. The Flotten coordinated operations between branches without concern for detailed planning. Below the Flotten, two Jagdkorps commanded Luftwaffe fighters. The Korps were responsible for planning, supervision and analysis rather than operational control and included large intelligence and weather sections. Divisions came below the Korps. There were three divisions in Germany each with a staff of some six – 7,000 people. These included

The 1918 Treaty of Versailles had banned Germany from operating an armed air force. By the time the Second World War started the fledgling Luftwaffe was barely 4½ years old and, although it had grown into the largest air force in the world, it had a hierarchy gap of some 20 years and suffered from a lack of leaders and managers with core skills to fill key posts. Below the Divisions came the Geschwader (Wings). Geschwader were completely self-sufficient often having a fleet of transport aircraft for couriering orders and air rescue assets to collect downed pilots. The smallest independent units were the

Junkers Ju 87 Stuka dive-bombers of the Luftwaffe in action

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Gruppen (Groups), of which there were three per Geschwader. Each Gruppe had repair and administrative facilities and was more often than not co-located at an airfield with one of its three or four squadrons (Staffel). The Staffeln initially consisted of 12 pilots and was usually led by a Hauptmann (Captain), supported by four other officers and seven NCO pilots. As the War progressed the acute shortage of suitable leaders forced Staffeln to be increased to a complement of 16 pilots. By the end of the War most units had at least 20.

This structural overview clearly shows a hierarchical organisation. Higher headquarters were particularly bureaucratic, communication was often slow and direction imprecise[7], probably reflecting a lack of quality and experience forced by the Versailles restrictions. As a First World War ace himself, Goering recognised that lack of leadership throughout the expanding force would create problems as the War progressed. Towards the end of the Battle of France in 1940, he made a bold move. The majority of the then in-place Kommodores (Wing-Commanders) were

Adolf Galland (left) and Werner Mölders (right) each side of Ernst Udet

Galland, Mölders and von Maltzahn (to name but a few) are regarded amongst the Luftwaffe's all-time great leaders. These men were fliers at heart and would regularly fly in combat with a squadron or in their own Stab (staff) formations

pilots who had flown in the 1914–18 War. None of these had modern aircraft experience and all commanded from the comfort of headquarters. Goering replaced these veterans with young 'talent' from the Gruppen. It was his intention to send the clear message that future leaders must set an example to those on the front-line. The selected Kommodore were all under 30 and had been chosen because they were the highest scoring pilots at the time. Despite being selected predominantly for their flying skills, most were also outstanding all-round officers. Galland, Mölders and von Maltzahn (to name but a few) are regarded amongst the Luftwaffe's all-time great leaders. These men were fliers at heart and had empathy with their men on the front-line. Importantly they kept on flying in their staff appointments. They would regularly fly in combat with a squadron or in their own Stab (staff) formations. Whilst the Kommodores were notionally staff officers they had little time for paper-work, being more interested in tactical matters. They encouraged their pilots to think laterally and empowered them to be independent. The German concept of mission command was exploited to the full. They were often seen on the flight-line, were popular with air and ground crews alike and became role models to their subordinates setting the tone of their Wings by example. Their often gregarious personalities broke the mould of their stereotypical Prussian predecessors and became part of a catalyst that began to foster a unique Jagdwaffe culture.

Power relationships

Power relationships often play a major role in determining the efficiency of organisations. Many successful modern businesses encourage devolution of power and respect the views from the lower levels in decision-making. This 'bottom-up' approach often fosters participation in problem solving across all levels. This was

Hitler [insisted] on technical investment into the V1 and V2 rockets, which he (virtually alone) believed would deliver the killer blow to the Allies. This probably delayed the Luftwaffe's first jet, the ME 262 into service, and contributed considerably to the loss of the air war

not the case in the Luftwaffe. The Nazi Party maintained tight control over its armed forces. The concept of mission command, lauded as one of the keys to Blitzkrieg success, was encouraged at the tactical level by the Kommodores, but did not extend to the operational and strategic levels and the relationships between Hitler, Goering and Luftwaffe higher command.

At the outbreak of the War, Goering recognised the dearth of experience and leadership in the Luftwaffe (see previous section), but Hitler centralised control over the military to the detriment of its effectiveness. Although he had little understanding of air power he consistently interfered in strategic decision-making. The entry of America, with its considerable air power, into the conflict in 1943 highlighted the lack of investment in air defence systems in earlier war years. Luftwaffe higher command, including the then General Galland, Armaments Minister Speer and Goering decided to increase production in fighters to arrest the decline. Hitler overturned the decision, insisting on technical investment into the V1 and V2 rockets, which he (virtually alone) believed would deliver the killer blow to the Allies. This probably delayed the Luftwaffe's first jet, the ME 262 into service, and contributed considerably to the loss of the air war.

A lack of respect for this strategic leadership existed on the front-line. Hitler was sarcastically referred to as Grofaz[8], a nickname meaning the 'greatest leader of all time'. He became so

obsessed with detail that he even decided what type of cannons should be fitted to new aircraft types. Despite having not flown since the early 20s, Goering also continually interfered at the tactical level. When at home, Goering maintained a link with headquarters via radio and would listen to reports of in-coming raids. Occasionally he assumed direct command of fighter units operating over Germany. When sitting in his living-room, he would infuriate headquarters staff by radioing, 'The Reichsmarschall is taking over' and, whilst sipping on Brandy, would direct fighters to target enemy raids. On one such occasion, he misinterpreted observation reports and vectored fighters to chase phantom targets across Germany and into the Czech Republic, whilst the actual bomber package attacked Düren in the West. Goering was a Hitler sycophant[9] and pilots who progressed into leadership roles, such as Galland and Trautloft, considered him incompetent, with little comprehension for modern air power. However, although he was not despised by his subordinates (many believed him solely responsible for the establishment of an independent Luftwaffe in the first place), he was disaffectedly referred to on the front-line as der Dicke (Fatty).

In the context of structure and power relationships, the conflict between the centralised control of the Party and the lack of suitable experience in operational headquarters required for the demands of modern fast-moving air warfare, the importance of the 'young' Kommodores (and their subsequent promotion into higher staff posts) should not be underestimated. The Luftwaffe was hierarchical and bureaucratic in structure and, understanding the pressures of the front-line, they empowered their subordinates to 'do what was right'. With input into the selection of their Staffel and Gruppe commanders, the Kommodores were able to pick pilots in their own mould as successors and thereby influence the long-term culture of the force. They believed in what they did and were not afraid to challenge decisions they did not agree with. At one of the regular meetings Goering held in his home to communicate the Führer's wishes to his pilots, Lutzow, one of the original 'young' Kommodores, banged his fist on the table and said:

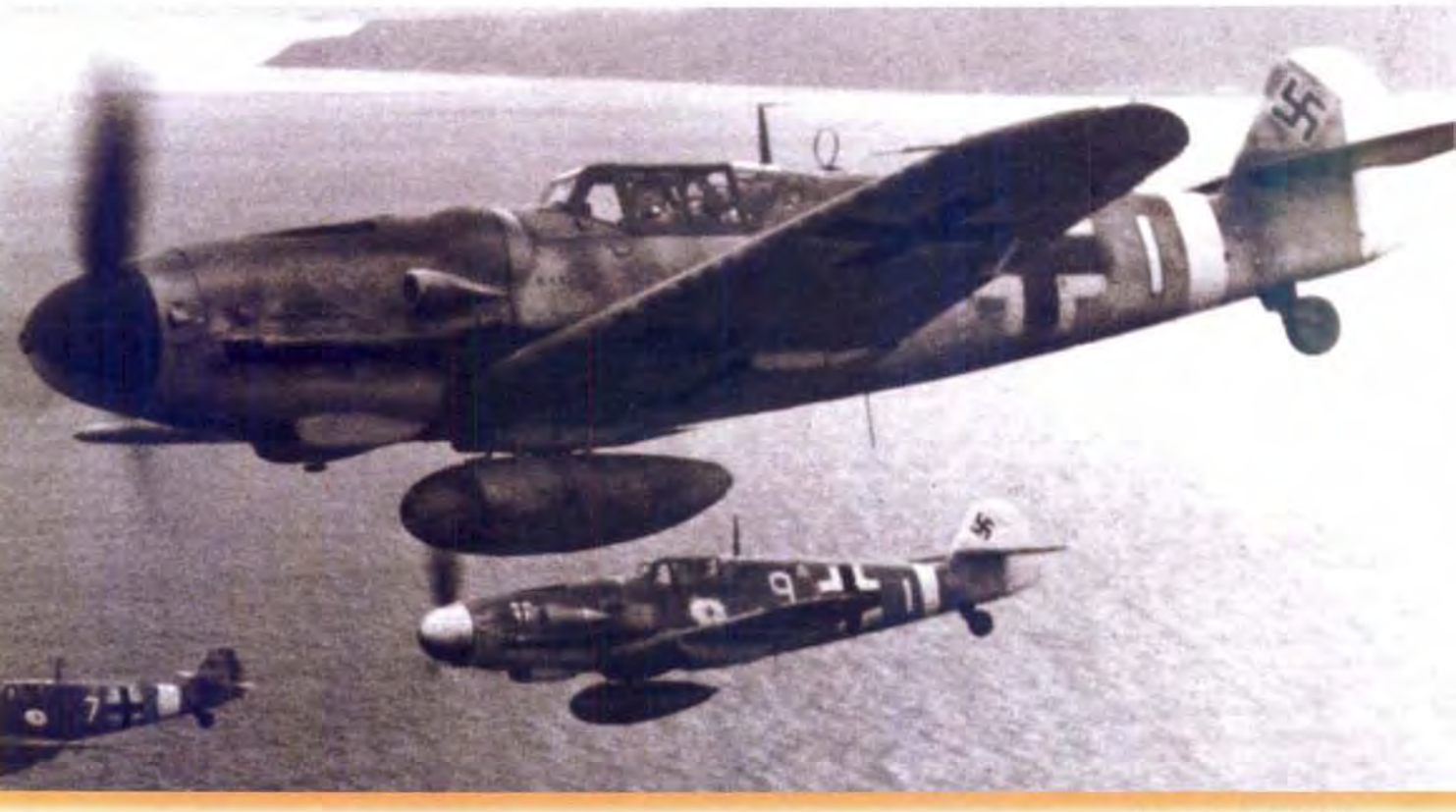
'Herr Reichsmarschall could you stop talking for just 5 minutes and listen to what is really going on, otherwise this meeting will be meaningless?'.[10]

Such forthrightness permeated the ranks of pilots and set a powerful example to the Jagdflieger as a whole.

Control Systems

Control systems include training, reporting, and personnel issues, such as career management. This section will describe the rigid selection and challenging training systems, and how the lack of control systems at strategic and operational level combined with the nature of the Nazi party as a whole led to a number of key strategic lessons being overlooked. The Paper continues by explaining how ad-hoc systems developed at Geschwader level, combined with an effective use of empirical information, helped the Jagdflieger overcome the lack of formal methods and maximise pilot utility.

Pilots could enter the Luftwaffe either as officers or as NCOs. Officer training included two years general service instruction at air warfare school. NCOs went directly to flight training. In both cases selection was particularly intense. The entrance examination required to progress to the interview stages was considered harder than the school leaving examination[11]and only 5% of applicants passed. The selection procedure lasted three days and included motor skill tests as well as leadership games (those unsuccessful for pilot selection were recommended to other forces based on their performances). However, performance in the interviews was most important. The interview team of six officers would question an individual's motivation to become a pilot. In one of his entrance interviews, Meimberg was repeatedly asked what he would do if he was told he didn't have the aptitude to become a pilot. He repeatedly replied that he knew he did have the aptitude and refused to be drawn to discuss possible alternatives.[12] Former Jagdflieger agree that such a single-minded approach was key to acceptance for pilot training.[13] Although most 'cadets' wished to fly fighters, the Luftwaffe considered bomber-flying to require greater skill and selected those



Messerschmitt Me-109s

The average age of fighter pilots in 1939 was 26, but by the end of the War this had reduced to 23 . . . Luftwaffe statistics, used . . . throughout the War, show that the number of victories achieved after the age of 28 dropped off markedly

with a propensity for instrument flying at an early stage for bomber conversion. Basic piloting was completed as part of the air warfare school and upon graduation prospective Jagdflieger were sent to fighter conversion schools to join with NCOs who had followed the shorter path. These schools were demanding in more ways than one. Pilots displaying insufficient skill or aggression became flying instructors or re-roled to the army. The accident rate for students was also high. Records from the conversion school Schleissheim for October 1939 show 6 serious crashes,[14] whilst an instructor from JS 3 (Fighter School) considered it not unusual to lose 30 from a course of 120.[15] After 4 months conversion training the 'survivors' were posted to front-line units.

Skawran, a German psychologist, conducted a study into the personal qualities of the Jagdflieger. He concluded that graduates who successfully transitioned onto front-line squadrons shared many individual characteristics; the fighter

Wreckage of an Me 109

Towards the latter part of the War the lack of strategy led to disillusioned front-line pilots describing higher authority 'chasing the last bomb crater' as units were re-deployed at short notice to protect areas that had just been bombed. 'The Luftwaffe went into the War as a [leaderless] torso and finished as a torso'

pilot was normally very gifted across the board. Empirical evidence shows that Jagdflieger who were invalided to army units because of flying preventative disabilities made exceptional ground officers. Conversely, very few soldiers aspiring to transfer to the Luftwaffe successfully completed training. In general, the types of people who graduated to fighter squadrons had shown intense competitiveness throughout training and transferred that into a 'killer' instinct upon contact with the enemy. Interestingly, the study was able to show that a majority of these pilots did not grow-up in cities but more than likely came from smaller regional centres or the country and lacked the metropolitan awareness of fashion and style of their army peers. Most had a dislike for crowds and for direct responsibility of others, preferring to work alone or in small groups. They shared an almost universal dislike of textbooks and of the education system, but not of learning itself, demonstrated by a passion for practical activity and things technical. Leisure

time was spent on individual activities such as horse-riding, or hunting, abseiling or driving fast cars (quickly). To a man they enjoyed skiing — even those from northern Germany were keen winter sportsmen and all had a love of pure flying. Comparative research shows that in contrast to day-bomber, night-fighter and transport pilots, who saw their role as procedural in nature, Jagdflieger had a passion for aerobatics. There was very little interest in team related sports. In line with the Nazi party ethos of developing a strong Arian race, organised squadron sporting activities were based on individual prowess, such as swimming, athletics or shooting. None of the pilots interviewed for this Paper expressed any interest in football. The average age of fighter pilots in 1939 was 26, but by the end of the War this had reduced to 23.[16] This cannot solely be attributed to attrition, but is also a reflection of the physical demands of combat and the efforts made to train younger pilots for the front-line. Luftwaffe statistics, used to inform throughout the War, show that the number of victories achieved after the age of 28 dropped off markedly, probably caused by deterioration in eyesight and the extra physical demands due to increased aircraft performance. This feedback encouraged the Luftwaffe to actively recruit younger candidates and to move those in their late 20s, showing signs of burnout, into headquarters. Towards the end of the War the Jagdwaffe had a number of 17-year-old pilots on squadrons [17] and although this was probably more a measure of the desperation of the situation in 1945, that it was permitted shows the faith that the Luftwaffe held in its empirical information.

Despite having described the Luftwaffe as a bureaucratic hierarchy, the Paper argues that it suffered from a lack of over-arching standardisation or strategic control. Inline with the overall politics of the Third Reich, the Luftwaffe was founded on the Führerprinzip — central control with personal momentum to the fore. Structures, processes and regulations were never effectively put into place. This resulted in strong personalities being able to bend or break the rules (if Hitler condoned it). The absence of strategic control is highlighted by the bewildering variety of aircraft types brought into service and the lack of any standardization between them. A lack of overall direction and a dearth of suitably experienced personnel in headquarters to drive through strategy reduced standardisation and led to an increasing number of special units or Sonderkommando being formed.

The Luftwaffe also ignored many strategic lessons. Pilots returning from service with the Legion Kondor during the Spanish Civil War were comprehensively debriefed in Korps headquarters with the intention of using the lessons to help inform the ongoing organisation of the Divisions. However, the only evidence of 'feedback' from this campaign was at the tactical level. The methods of cooperation and integration with ground troops laid down and exercised in Spain gave the German Army overwhelming advantage during the Blitzkrieg of 1939.[18] This paper argues that the air tactics developed ostensibly by (the then Hauptmann) Mölders in Spain provided the Jagdwaffe with tactical advantage until the introduction of the Mustang into the conflict in 1943. The importance of air superiority, so tenaciously contested over the Channel in 1940, was forgotten (or ignored) by the Luftwaffe leadership when Germany came under heavy Allied attack from 1943, and towards the latter part of the War the lack of strategy led to disillusioned front-line pilots describing higher authority 'chasing the last bomb crater' as units were re-deployed at short notice to protect areas that had just been bombed. 'The Luftwaffe went into the War as a [leaderless] torso and finished as a torso'.[19]

Nevertheless, under the command of dynamic Kommodores, ad-hoc control systems existed at tactical level. Squadrons laid great importance on both briefing and de-briefing. Briefing was almost exclusively conducted by the Staka (Squadron Commander) and included the overall plan (as directed by the Divisions), expected enemy activity and the tactics that were to be employed for the particular mission. De-briefing was a far more convoluted process. Purely factual 'hot' debriefs, immediately after engine shutdown were given to the intelligence officer and concentrated mainly on claims of enemy kills or other relevant details. Subsequently the Staka and sometimes even Kommodore would call an overall mission

debrief. Here the sortie would be discussed in great detail. The enemy disposition and tactics would be balanced against the Jagdwaffe plan and execution. Lessons identified would then be passed to other units in the Geschwader to be incorporated into future plans. There is also evidence that Jagdflieger would visit enemy pilots in captivity to discuss their tactics[20]. Considering the structure of the Luftwaffe, discussed above, it is no surprise that there was no formal system in place to disseminate lessons between Geschwader. In spite of this, informal contact was often made between Kommodores, when pilots were posted between wings, or when aircraft diverted to other airfields.

It can therefore be concluded that despite a lack of formal control systems the Jagdwaffe could, at the tactical level, be described as a learning organisation. The training system delivered single-minded pilots with a love of flying and things practical; individual competitors who thrived in the empowered environment fostered by their Kommodores. Encouraged to contribute to all levels of discussion, tactics were often developed at the lowest level. The reliance on briefing and de-briefing to formalise and communicate intention across Geschwader ensured that a good degree of standardisation existed and that lessons were learned. The same cannot be said for the Luftwaffe as a whole. Paralysed by Hitler's Führerprinzip, it entered the War without direction and did not develop suitable systems to learn from its own mistakes. The inability of the organisation to recognise its own failures eventually led to its downfall and the relative efficiency of individual Geschwader could not compensate for this lack of strategic learning.

Rituals and routines

Rituals are events or ceremonies that occur regularly. Contemporary air force rituals are likely to be a flight-hours celebration or a 'hosing' after a last sortie on a squadron. Routines are the interactions that take place between organisational members. For deployed military units this definition expands to cover the whole way of life as members interact with one another. Even more than peacetime organisations, the interaction between individuals under the intense pressures of war play an important part in defining the culture of the unit. The day-to-day existence of the Jagdwaffe was influenced by the characteristics of its members and their interaction. This section will show that Jagdflieger required a special mentality to survive and, unlike other military units, most shared common interests and outlooks.

Jagdflieger lived a nomadic lifestyle. They would remain in one place for only short periods, moving from field to field to in reaction to the battle-tempo. Fear of attack from resistance fighters in occupied territories often forced the squadron to live under canvas next to their aircraft within the protection of an airfield. Field-living became a great 'leveller' and, other than to distinguish the Staka from the rest of the squadron, rank rarely played a role. Indeed, the intensity of the air war meant that squadrons were run as meritocracies. The best pilots, regardless of rank, would plan and lead formations. The adopted 'Mölders' formation was a fighting four-ship (Schwarm) made up of two pairs (Rotte). Although the Staka or his deputy usually led the Schwarm, oftentimes, an experienced NCO would lead the rear Rotte with an officer as his Kaczmarek (Wing-man). The distinction between class and rank was not considered important and rarely played a part in the daily Jagdstaffeln routine. This is in stark contrast to similar sized German army units, where officers lived and ate separately. The Jagdwaffe believed that a class hierarchy existed in RAF fighter units during the Battle of Britain. During combat over St Omer, one of Galland's Geschwader pilots collided with Douglas Bader. Galland went to visit the convalescing Bader in hospital where, not realising he had been accidentally rammed and not shot-down, Bader whispered into Galland's ear, 'Please, tell me that I wasn't shot down by an NCO'. Surprised by this apparently unimportant request, Galland subsequently introduced a tall, blond, Aryan Lieutenant to Bader as his victor[21], and used the story as a source of morale within his Geschwader to show the 'pompous' nature of the enemy.[22]

Jagdflieger started the day with communal breakfast, followed by the day's briefing. Often there would only be time for one briefing per day and this would nearly always be conducted by the Staka and normally close to the latrines. Extreme nervousness would climax in panic and many pilots would be sick during the brief. This was particularly acute in the West during the Battle of Britain; the pilots conscious that the odds against the whole squadron surviving until the end of day de-brief were steadily decreasing. However, once in their cockpits, they gradually built confidence that culminated in a massive rush of adrenalin upon contact with the enemy. Many pilots found it difficult to explain what had happened in combat, but most had recollection of the red 'low-fuel' light flashing on and of nervousness associated with a fear of not reaching a landing site before running out.[23]

At the height of the Battle of Britain and during the defence of Germany in 1943-45, pilots could fly up to 5 times daily. At the end of the day expended energy levels and a drop in adrenalin left them feeling apathetic during de-briefing. With little enthusiasm to move from the mess or de-briefing tent they would often laze around in sweaty flying overalls and slowly sink in to depression. Psychologists and Geschwader physicians recommended reading, horse-riding or even playing table-tennis as relaxation, but more often than not the only forms of escape available were alcohol, cards, cabaret and for some prostitutes.[24] Control of the squadron at this transitional time in the day was one of the most difficult tasks faced by the Staka. Younger more impressionable pilots were often unable to handle the rapid personality changes and became particularly affected. 'New-boys' were integrated onto the squadron as quickly as possible. They were never ostracised by other pilots and oftentimes Staka would take them as their wingmen. Adjusting to squadron life was not easy for a newcomer and squadron commanders often invented ingenious ways to focus younger pilots and prevent them slipping into depression. Hans 'Assi' Hahn established a small zoo on his squadron and each pilot was given responsibility for looking after one of the animals in it. With few alternative distractions pilots took their responsibilities seriously. It is perhaps no little coincidence that Hahn's 4/JG2 (Jagdgeschwader-Fighter-Wing) was regarded as one of the most efficient in the Luftwaffe. The Staka role was understandably demanding; these additional responsibilities almost certainly contributed to the comparative reduction in victories, as pilots became squadron commanders.

Although pilots were very much individuals, their nomadic lifestyle and common experiences moulded squadrons into a brotherhood that was not easily accessed by outsiders.[25] Pilots transferring from bomber or transport aircraft were particularly unsuccessful. Almost all asked about the squadron's combat losses upon arrival and, as bomber pilots were defensive minded in nature and relied on a crew for assistance, many were shot down on the earliest sorties. Those that did survive were often subsequently suspended from the squadron because they had a negative influence on morale.

The Staka had the pivotal leadership role and the personality and style of the squadron commander had a great influence on the character of the unit. The disciplines required for Staka duties were many and varied. Meimberg describes the most difficult aspects of command to be the writing of letters to a fallen comrade's loved ones and telling an experienced pilot that he was burnt-out and to be relieved of flying duties.[26] To achieve these, as well as set discipline and domestic living standards under the stresses of combat was an enormous burden that required a special type of leader. Although the Kommodores were able to influence the selection of squadron commanders, the Reichsmarschall insisted that each of his Stakas had enough credibility to lead. But credibility in the eyes of Luftwaffe higher command was measured in number of airborne victories. This sometimes led to selection of Staka and even Gruppenführer (group-leaders) with less than ideal leadership qualities. One such individual was Helmut Wick, who recorded 11 victories in 10 days in October 1940 and in line with the Führerprinzip, was given command of JG 26. But Wick was only 25 and lacked the skills and experience required to care for the 700 or so men

in his command. His fighting technique was characterised by individualism, always climbing at full power straight from take-off, he showed little concern for the rest of his formation in his quest for advantage over the enemy. This may account for his remarkable striking rate, but also the relatively high losses and lack of morale across his Wing. Wick was impetuous and on 5 November 1940 in his impatience to become the Jagdwaffe's leading ace, he attacked a wing of Spitfires with only his Schwarm as support and was shot-down, never to be found.[27]

Skawran pigeonholes individuals such as Wick in a group he coins 'fighters'. Characterised by incredible self-belief, they found flying easy, amassed kills quickly and consequently achieved leadership positions. They often ridiculed other squadron pilots and had a total disregard for authority, wearing scruffy uniforms and openly criticising the political leadership. This had a negative affect on squadron morale however, 'fighters' almost always fell in combat and were therefore regularly replaced. Nevertheless, whilst the rapid rise of Helmut Wick is extreme, most front-line pilots interviewed agreed the need for credibility within their immediate command chain and, that Kommodores would not normally recommend officers for Staka duties until they had achieved 20 kills regardless of leadership potential was seen as an acceptable compromise.[28]

Despite its challenges, most Stakas interviewed after the War described it as the best time of their careers, developing strong bonds with their units. Such was his bond that, even as a general, Galland spent periods of leave with his old squadron and even flew the occasional operational sortie. Kommodores empowered the Staka to run the squadron his way and many developed close relationships with their pilots. Towards the end of the War, when there was a need to combine units to generate efficiencies, it was almost impossible to overcome these loyalties and sometimes, even when squadrons had officially disbanded, they continued to operate unter-der-Theke (under-the-counter) beneath the umbrella of the respective Geschwader.[29]

The Jagdflieger had a love of good food and of quality wine and spirits. Whenever poor weather or the operational tempo permitted, pilots would frequent high quality restaurants, eat expensive local delicacies and drink the best alcohol available. Adapting to the local tastes was something the pilots loved doing. On evenings off the Jagdflieger considered themselves as elite, and conducted themselves accordingly. In line with their individuality, pilots would rarely socialize in large crowds, preferring small groups of two or three. Pilots drank heavily but were rarely drunk in public, indeed sobriety was an essential ingredient in another of the pilot's favourite pastimes — flirting. Such was their high self-esteem that many considered flirting with local girls to be an essential part of a night out. Nevertheless, a good number of 'country princesses' became engaged or married to Jagdflieger met during evenings away from operations.[30] Many of the less successful 'flirters' used prostitutes as a source of entertainment. Commanders condoned the surreptitious use of brothels, not only as a source of relief from the stresses of battle, but also as a distraction from homosexual temptation, a problem throughout the military at the time.[31] On the eastern front particularly, military brothels were set up at Geschwader level to deter homosexuality that Staka believed would undermine morale. VD was an accepted disadvantage. The Luftwaffe also established two Kur (health) resorts, one each for bomber and fighter crews, on a Bavarian lakeside. Attendance was primarily for rest and recuperation and for the exchange of experiences between crews, however sufficient 'nurses' were available to guarantee complete relaxation. Although not openly admitted the availability of such resorts had a positive input on squadron morale.[32]

Most pilots had a Christian background and many recall a deep sense of religion that accompanied them in the cockpit. This was a conscious or intellectual process, rather a spiritual feeling brought on by the adrenalin rush of combat. The Nazi culture had an aversion to religion and religious services were not available in the Luftwaffe. Nevertheless, most admitted that after

The thrill of duel and not the killing of the opponent distances Jagdwaffe pilots from many of the atrocities associated with Nazi Germany

a period on the ground of about a week, they would turn to the bible as a source of strength and justification[33]. Although Jagdflieger were highly self-confident, they were often very superstitious. Many carried lucky charms or keepsakes into combat and most had a pre-flight routine of checking their aircraft and personal equipment that if interrupted would have to be re-started from the beginning. When interviewed all pilots admitted that they were interested only in shooting down the other aircraft. Most tried not to think about the fate of the opposition pilots, and those that did often suffered from bouts of severe depression. Jagdflieger could not follow a stricken aircraft to its point of impact. In all probability this was not purely based on sound airmanship, but was also a subconscious attempt to prevent the engagements from becoming personal. The thrill of duel and not the killing of the opponent distances Jagdwaffe pilots from many of the atrocities associated with Nazi Germany.

Symbols

A symbol is something that represents another thing. It could be argued that ceremonies and stories are also symbols of the organisation, but this section will focus on specific items. Corporate logos, reward systems or company cars are

contemporary artefacts of what is symbolic. The intangible aspects of beliefs and values become visible through symbols. The Jagdwaffe was no different. Geschwader carried the name of a famous First World War hero or some other dignitary. For instance JG 2 Richthofen and JG 3 Udet named after noted fighter pilots of World War One. JG 26 was named after Albert Schlageter, a 1920s freedom fighter against the annexation of the Rheinland by the French, who operated in the Düsseldorf area where JG 26 was formed. These symbols of German heroes should not be underestimated. Certainly the ruthlessness of yellow painted noses of the Schlageter Messeschmitt's generated a mystique amongst RAF crews that gave JG 26 a psychological advantage over its opponents. But identity and belonging was also important to newly qualified pilots. Meimberg commented upon his assignment to JG 2 after completion of training: '. . . I literally burst with joy and pride: Richthofen the most famous of all fighter pilots'.[34] Pilots would wear the name of their Geschwader on the sleeve of their dress tunic, which would be worn with pride, particularly during evenings 'on the town'. The adoption of these names was particularly successful and sub-consciously many pilots believed that belonging to a famous unit gave them an advantage over the opposition.[35]

The other symbolic item of clothing associated with the Jagdflieger was the silk scarf. The scarf was presented along with a flugschein (pilots licence) and pilot wings upon completion of training. Along with the sense of relief at successfully passing the course, all agree that the silk scarf just visible above the tunic collar was a valued prize.[36] The scarf was an unpronounced message to everyone they met, that they now belonged to an elite band.

Medals were the great Jagdflieger incentive. The first medals awarded were the Iron Cross, second and then first class, for the first and fifth kills respectively and were worn on the tunic. The Ritterkreuz was awarded for the twentieth victory and early in the War was personally presented by Hitler or Goering. The Ritterkreuz was worn around the neck and was much sought after. Although it was presented on a ribbon, it was common practise for recipients to hang the medal from a wife or girlfriend's suitably coloured garter. Again this was a silent reinforcement of a pilot's prowess and superiority in battle and became an incredible motivator. It was intended that the Ritterkreuz would be the highest decoration, but as the War progressed it was necessary to add new superlatives to it. Oak leaves were added for 40 victories, swords for 70 and diamonds for 100. The Front Flight Wings (Frontflugspange) in gold, silver or bronze were given for combat missions with enemy contact and the cup of honour awarded by Goering for exceptional duty. It was also possible to be mentioned in dispatches.

Competition to become the highest scoring pilot was intense and Jagdflieger went to extreme lengths to achieve it. Helmut Wick's pursuit of this goal was described above. Mölders achieved his fortieth kill just before Galland in September 1940 and flew to Goering's lodge at Karinhall to receive his oak leaves. Goering invited Mölders to stay for 2 days hunting with him in the extensive grounds. Knowing that Galland was due at Karinhall 3 days later to receive his award, Mölders asked Goering to invite Galland to remain behind for a similar period after his ceremony to prevent him gaining an unfair advantage. Goering agreed.[37] Although medal chasing provided a great incentive for pilots to achieve victories it also created problems. Oftentimes, pilots approaching a victory milestone would euphemistically contract Halsschmerzen (throat-ache). Otherwise prudent pilots would become fixated on the prize and begin to take excessive risks. Staka would sometimes have to ground them for a short period until they had regained a sense of perspective.[38]

Frustrated at the loss of air superiority over Germany, the ease with which Jagdflieger on the eastern front had achieved victory milestones and a desire to open up the award system to crews operating in different roles, Goering introduced a points system in 1944 to redress the balance. Unfortunately, this system made it harder for Jagdflieger defending the Reich to achieve the milestones and had a detrimental effect on morale just when the Allies were gaining the

upper hand. Nevertheless, Galland believed that pilots continued to be stimulated by the race for decorations despite the policy changes.[39]

Even with the 1944 realignment, there is little doubt that the belonging, pride and competition achieved by the adoption of Geschwader names and recognition of performance through medals and trophies had a disproportionate impact on the culture of the Jagdflieger and one that contributed greatly to competitive advantage over opposition that did not subscribe to a similar system.

Stories and myths

The difficulty of defining culture was described earlier in the Paper; however one way in which it can be 'brought to life' is through the stories that people tell about the organisation. Story telling is a way in which people make sense of events or actions. The myths and legends that build up around particular events and people embed the past in the present. Stories help to identify the negative and positive role models, the villains and deviants who do not fit with the organisation's modus operandi, and the heroes who do. Stories may or may not be strictly accurate because their purpose is to convey a message to show who is valued, the reasons why and the behaviours and actions this represents. They help explain why things are done the way they are.

The heroes of the Jagdflieger were the young Kommodores who attempted to bridge the gap between the realities of the front-line and the often-misplaced demands of higher authority. Without a standing air force to provide role models until the 1935 formation of the Luftwaffe, the stories of the battles in Spain were the first to affect its cultural mould. Mölders is remembered for tactics development and stories surrounding him are embellished to highlight that a smarter thinker can often overcome a superior opponent. Galland was the official face of the Luftwaffe and pin-up of his time and became the role model that encouraged many to volunteer for flying duties. But Galland was more than that to the Jagdflieger and as he progressed through the ranks to become Inspector of Fighters towards the end of the War, stories of his earlier days became folklore for the squadron pilots.

Adolf Galland

Galland and his wingman shot down two Spitfires on the way to Brest and another upon their return. Galland celebrated in his usual style by lighting a large cigar and drinking a brandy by the side of his aircraft. He was a free thinker, interpreting rules liberally without ever disobeying them

Galland was a flyer at heart and did not like periods of inaction. Whilst based in the Pas-de-Calais in the summer 1940, he spontaneously decided to fly to Brest to collect lobsters for a birthday party he was invited to that evening. Although it was forbidden to engage the enemy unless in self-defence, Galland chose to take a detour and fly at low-level across southern England. Naturally he was on the look-out for unsuspecting prey and indeed Galland and his wingman shot down two Spitfires on the way to Brest and another upon their return. Galland celebrated in his usual style by lighting a large cigar and drinking a brandy by the side of his aircraft. He was a free thinker, interpreting rules liberally without ever disobeying them, and it was this attitude, generally shared by the other young Kommodores that began to permeate the Jagdflieger from the autumn of 1940. Even during the successful early part of the War this breed of flyer was not afraid to speak its mind. During a visit to fighter units on the French coast in summer 1940, Goering gathered together his Kommodores and Stakas and asked 'can I get you anything to make your stay here more comfortable?' Galland immediately replied 'a squadron of Spitfires Herr Reichsmarschall'. The relationship between Galland and his superiors was often tempestuous, with Galland never afraid to question the direction of authority. He passionately believed that the Reich should concentrate effort on fighter production to maintain, and later regain, air superiority. Hitler did not agree. As the War turned against the Germans, Goering attempted to blame its failure on the inability of the Jagdflieger to gain control of the air. He suggested to Galland, then in his role as Inspector, that his pilots had turned in the face of the enemy. Galland tore off his medals, threw them on the table and walked out. Reduced in rank to colonel, Galland finished the War as Kommodore of an ME 262 wing in Bavaria.[40] Although these stories centre on Galland, they epitomise the trust and respect the Jagdflieger held for those pilots, including, Kesselring and Ritter von Greim who progressed quickly through the ranks and were not afraid to challenge the Party leadership.

These tales give an idea of the pragmatic type of leader respected by Jagdflieger; however, stories that describe the opposition also influenced culture. There are many stories about RAF pilots in the conflict and interviewees were at pains to stress their respect for them. Merian remembers one battle over Aachen during which a combined RAF and USAAF formation was engaged by his JG 106. One of his colleagues bailed out after being shot-down by a Mustang. His parachute opened at about 2000 metres and immediately RAF Spitfires began to circle the descending airman to protect him from attack by the Mustangs.[41] All the pilots interviewed agreed that RAF pilots were 'fair'.[42] The Americans however, were ruthless and from the beginning of 1944 began to shoot at pilots in parachutes. Seeger describes jumping from his burning Messeschmitt and being repeatedly shot at by USAAF Mustangs. They continued to strafe him on the ground and he only escaped by hiding in a drainage ditch.[43] The Americans were known as the Leichenflederer (body-ransackers), and in light of this, discussion about German willingness to continue fighting against the overwhelming odds towards the end of the War prompted emotional responses:

'We knew we were beaten and deserved to be beaten. We knew that we could re-build our cities — that was not the point, we fought to protect our family and friends below from the bombing — a lot of which was indiscriminate. We weren't fighting for political aims — we didn't understand them. We fought in spite of Grofaz and der Dicke and just wanted to stop those underneath from being killed. We knew what America stood for and we didn't want our children to succumb to its culture. That explains the economic wonder post war. We respected the Tommies but Dresden — what was that all about? You asked why we carried on fighting — why do you think?' If it hadn't have been for the bombing the War would have been over a year earlier'.[44]

So the stories and perhaps the myths surrounding the American way of war and the bombing of civilians had a powerful part to play in the motivation that drove the Jagdflieger on to the end, but there were lighter moments that helped relieve the pressure and reinforce the happy-go-lucky, love of life nature of the pilots. An example of this surrounds the interpretation of a 1943

order to conserve fuel. The order required all oxen grazing within the confines of the airfield to pull carts to replace service trucks that the pilots normally used to get around. Naturally this order was not popular but it had to be implemented by the following morning. Rather than resting for the next day's operations, pilots worked through the night coercing some 20 oxen off the camp and into nearby fields. The story continues with the pilots, covered from head to foot in oxen dung, saved from a snap inspection by headquarters staff checking compliance with the order, by 20 'homeless' oxen blocking the main road through the nearby town. The pilots kept their trucks[45]. Humility and the ability to laugh were characteristics that built a strong bond between the fliers.

The Jagdflieger paradigm

The paradigm can be described as the 'formula for success', which is taken for granted and has grown up over years[46]. The Jagdwaffe Paradigm was like no other in the German military at the time. Within a many layered, bureaucratic and centrally controlled organisation, the Jagdflieger thrived under the direction of some of the finest leaders to command anywhere in the War. By continuing to fly these men understood the pressures of the front, fostered learning systems and promoted pilots in their own mould, thus consolidating the culture. These Kommodores were the filter between unachievable requests from commanders and the realities of combat. Whether by intent or good fortune, Goering's appointment of these men was a masterstroke and became the catalyst from which the strategic culture began to take shape. The training system provided like-minded pilots who had a passion for flying. None were characterised as team players, and all demonstrated proficiency at individual sports. Yet the intensity of the air battles, the constant fear of death and the regular loss of close colleagues, fostered a brotherhood that only those willing to share were allowed to enter. Pilots experienced extremes of emotion, and in the evening, as adrenalin ebbed away, religion for some and alcohol for many became the alternate to depression. But the Jagdflieger were intensely proud of their vocation and when opportunity arose would show it. Affiliation to particular units and the tunic with silk scarf singled them out as elite, and in public they played the role to the full. Differentiation between Jagdflieger was signified by competition for medals and this became a great motivator. Stories express the young Kommodores as heroes and the enemy as villains, the Americans in particular providing motivation to fight to the end of the War. But the Paradigm can best be summarised in the chorus of the Jagdflieger song:

We loved life

We kissed the devil

Gave our hearts to the ladies

And didn't tremble when death welcomed us

That's what we call a pilot's life.[47]

Notes:

1 Spick (1996), p4

2 Grant (2001), p117

3 Gray (1999), p130

4 Deal and Kennedy (1982)

5 Johnson (1999), p83

6 Geoff Mallory et al (2001), p12

7 Wesel Jagdflieger, 28 Dec 02

8 Großter Feldherr aller Zeiten

9 Knopp (1998), p101

10 Skawran (1970), p189

11 Wesel Jagdflieger, 28 Dec 02.

12 Meimberg (2002), p24

13 Wesel Jagdflieger, 16 Feb 03

14 Meimberg (2002), p45

15 Wesel Jagdflieger, 28 Dec 02

16 Skawran (1970)

17 Wesel Jagdflieger, 28 Dec 02

18 Galland (1954), p33

19 Interview Braatz, 18 Mar 03.

20 Meimberg (2002), p265

21 Galland (1954), p84.

22 Wesel Jagdflieger, 28 Dec 02.

23 Wesel Jagdflieger, 16 Feb 03.

24 Skawran (1970), p212.

25 ibid, p138

26 Meimberg (2002), p210

27 Spick (1996), p73

28 Wesel Jagdflieger, 16 Feb 03

29Meimberg (2002), p228

30 Skawran (1970), p138

31 Isby (1998), p61

32 Wesel Jagdflieger, 28 Dec 02

33 Skawran (1970), p212

34 Meimberg (2002), p46

35 Wesel Jagdflieger, 16 Feb 03

36 Wesel Jagdflieger, 28 Dec 02

37 Galland (1956), p63

38 Wesel Jagdflieger, 16 Feb 03

39 Isby (1998), p61

40 41 Galland (1954), p168

42 Wesel Jagdflieger, 28 Dec 02

43 Wesel Jagdflieger, 16 Feb 03

44 Meimberg (2002), p267

45 Wesel Jagdflieger, 28 Dec 02

46 Jägerblatt - 05/2002

47 Johnson (1999), p80

D-Day landings at Normandy

Air-Land Co-operation in Normandy:

High-level petulance and intransigence coloured campaign execution

By Commodore I Moncrieff

To what extent did personality clashes and poorly defined command roles affect Air-Land co-operation in Normandy, and to what extent does current doctrine and command training equip the Joint Force for today's Air-Land battle?

D-Day was the fulcrum of decisive Allied offensive operations into Europe five years into a six year war of national survival. Yet disagreement at the Strategic/Operational level concerning preparatory OVERLORD shaping operations almost drove the Supreme Allied Commander to resign. Once underway, high-level petulance and intransigence amongst Allied Air Officers and between them and Land Command continued to colour campaign execution. Air-Land lessons learned in earlier campaigns, involving several of the same Operational Level commanders, were relegated below self-opinion and a poorly designed command structure. Allied Air Superiority and the FORTITUDE deception plan constrained the German response, but they were able to defend and counter-attack at key Allied objectives such as Caen and St Lô. Given the difficulties at the higher level, it is a paradox that these were overcome by joint and combined Air-Land operations. Overwhelming force and a more balanced view in delivering effect at tactical air/land command levels were instrumental in this achievement.

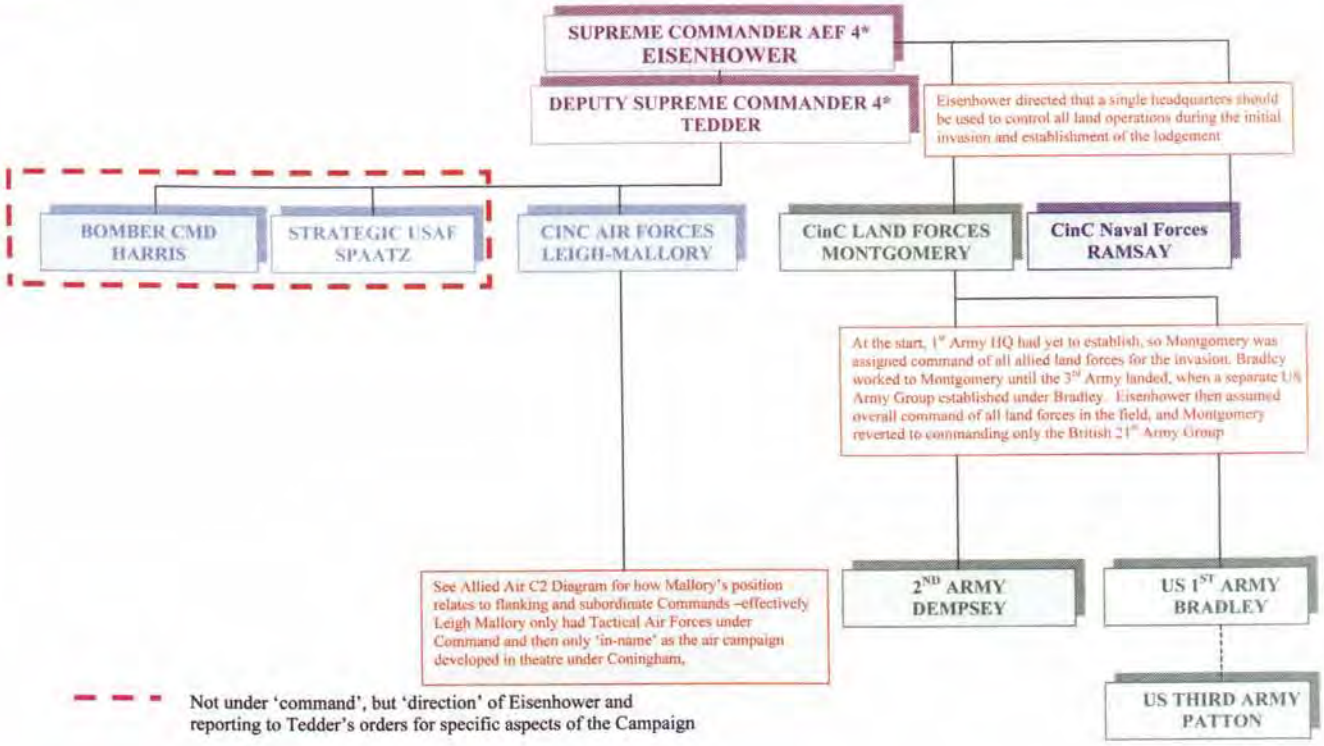


Figure 1: Operation Overlord — higher level C2 arrangements

The strategic climate is now more opaque. Wars are fought largely in coalition by choice rather than for national survival. The precision firepower, simultaneity, surprise and tempo required to deliver the philosopher's stone of manoeuvre warfare, demand unequivocal co-operation at and across all levels of command. Doctrine, command structures and training now acknowledge this, but as recent campaigns in the Gulf have shown, this is a subject that needs continual omni-directional work and astute monitoring by the higher levels of Joint Command. Some lessons identified have yet to become lessons learned and Project CONINGHAM-KEYES shows an appetite to do this that needs to be encouraged.

'The well-run group is not a battlefield of egos'[1]

Iterative debate stimulated by the intuition and experience amongst those in High Command must feature in all aspects of campaigning. Such officers will invariably be strongly self-willed, but where this is tainted by rampant egotism then there is grave danger of undermining unity of effort and command. Military history is replete with examples of senior personality clashes. This paper examines the impact of personal conflicts that reverberated between Allied air and land commanders in the joint, expeditionary operations of the Normandy campaign. Herein egos and previous experience between these commanders from earlier campaigns coloured mutual trust at the fulcrum of a war for national survival.

Inevitably there was a cost to this, although strong overall leadership by the Supreme Commander General Eisenhower and his deputy Air Chief Marshal Tedder over the more obdurate episodes, together with overwhelming air superiority, ensured that the end-state was unaffected.

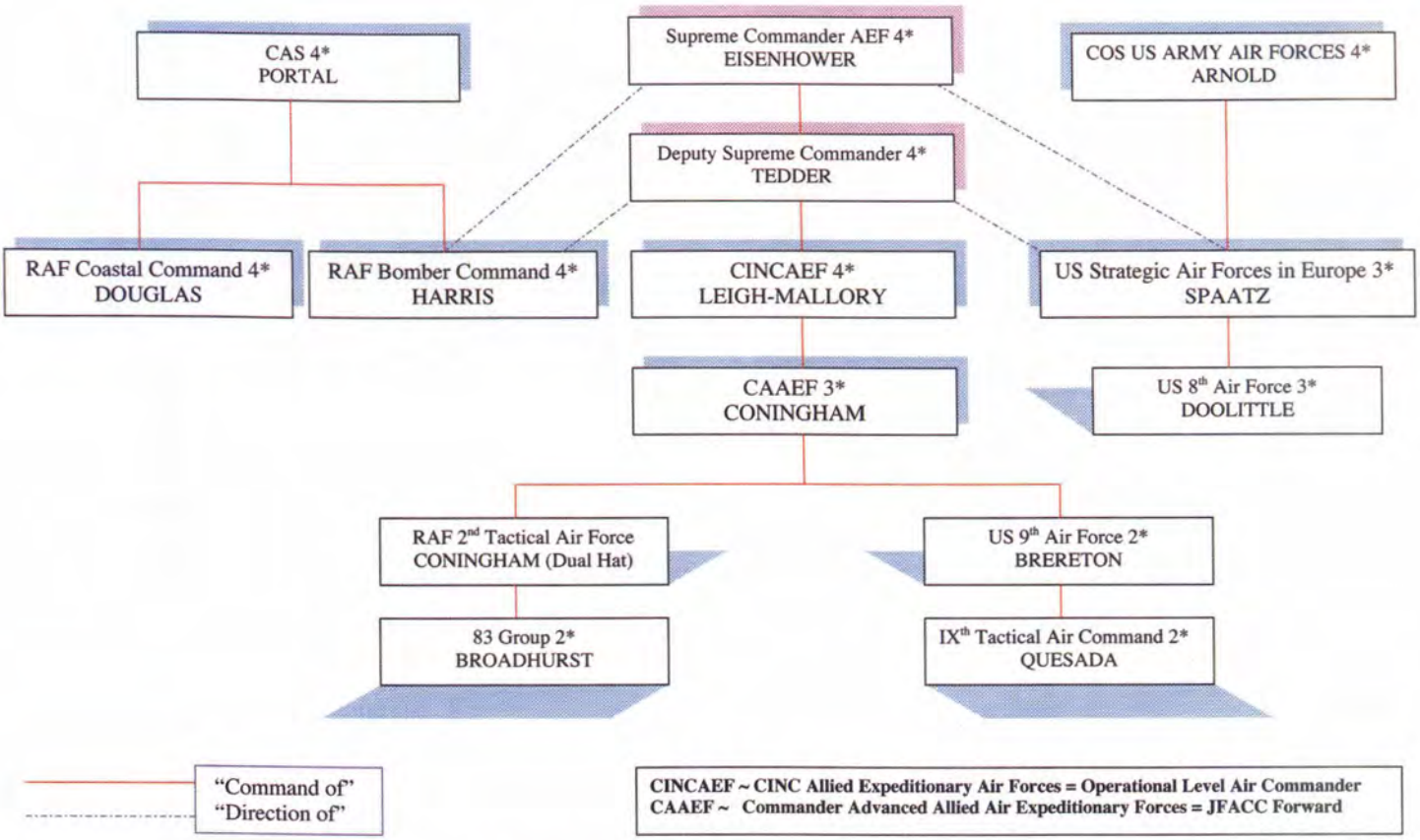


Figure 2: Operation Overlord — Allied Air C2 for Normandy campaign

The lessons for Air-Land co-operation endure in the present strategic environment. Whilst doctrine, staff training, war-fighting exercises and experimentation now recognise many of these, there remains no cause for complacency.

Command and control

'There were too many senior Air Force commanders, Tedder, Leigh Mallory, and Coningham, all in a sense treading on each other's heels.'[2]

The C2 structure was complex. The Allied Air C2 is shown at **Figure 2** and should be read alongside the combined OVERLORD C2 at **Figure 1**. This section describes the nuances that rendered this unwieldy.

Clarification sought by Tedder of his portfolio as Deputy Supreme Commander, through ACM Portal to Churchill[3], established that he, rather than Air Marshal Leigh-Mallory, held responsibility for the overall air plan for approval by the Supreme Commander, and ratification by the Combined Chiefs of Staff (CCS). However, this was not as clear-cut as in the Mediterranean, where 'Supreme Command' had meant authority over all Allied forces in the region. For OVERLORD, capabilities such as ACM Harris's Bomber Command under the POINTBLANK Directive,[4] and ACM Douglas's Coastal Command continued to have other work to do under Portal. Although Eisenhower won the argument that when required for OVERLORD, elements of these forces would be made available to Tedder, for the Air C2, the axiom of centralised control of air power was not being followed. Thus despite his CAAEF title, Leigh-Mallory only commanded the tactical air forces, which were then further delegated to Air Marshal Coningham. Leigh Mallory's and Coningham's HQ's were also physically dislocated, at Bentley Priory and Uxbridge respectively.

Air Marshal Leigh Mallory

Air Chief Marshal Tedder

Much to Leigh Mallory's chagrin, Eisenhower's ruling was that Coningham would be the only Air Commander with whom Montgomery would normally have to liaise

The choice of Tedder to frame strategic guidance as his deputy was equally prescient: he was the ideal grit in this particular oyster

General Montgomery's HQ was at Fort Southwick. His earlier much vaunted advocacy of co-location[5] was lost. The dual-hatted role of Montgomery at the campaign start initially set him on a par with Leigh-Mallory and later with Coningham, who also started with a dual-hatted role between the 'operational' and 'tactical' levels.[6] Much to Leigh Mallory's chagrin, Eisenhower's ruling was that Coningham would be the only Air Commander with whom Montgomery would normally have to liaise[7]. As will be shown, Montgomery tried to press this to his personal advantage in marginalising Coningham, preening Leigh-Mallory's ego by dealing directly with him on bomber support, as well as with AVM Broadhurst[8] on tactical air matters. Arguably Tedder should have intervened earlier than he eventually did to make plain that Coningham and Montgomery were to be equal partners. Tedder certainly had to battle with the consequences of the unorthodox C2 structure and tried to simplify it during the campaign without success, having to settle for making it work by managing the egos of the characters. However, it is clear that he was attuned to the issue on 20 April 1944 when he met with Portal and Leigh-Mallory and 'the command set up of the AEAF was batted around again'.[9] It is possible that Tedder had to accommodate Leigh-

The then Air Vice Marshal Coningham and General Montgomery during the Western Desert Campaign

Coningham who, along with Tedder, also felt that Montgomery faltered in making use of the air forces

Mallory, who was a Portal appointee. The records of this meeting[10] indicate that Tedder acceded to Leigh Mallory's representations of the latter's role in the structure and the title and role to be adopted by Coningham. The same records make it plain that Tedder foresaw the ramifications at the time. One might conclude that Tedder consented because he did not wish to push the matter with Portal and believed he could make it work.

This complex command structure was driven by the joint and combined nature of the battle ahead and with better mutual acceptance and support could have been made to work. However, undermined by character flaws and cross-cutting personality feuds from their past, both the Inter-Air and Air-Land aspects proved dysfunctional.

Dramatis personae

'Obviously he [Leigh Mallory] is a gutless bugger who refuses to take a chance and plays for safety on all occasions I have no use for him'.[11]

The CCS selection of Eisenhower as Supreme Commander Allied Expeditionary Forces reflected shrewd perception of Ike's potential[12] to mitigate the more extreme aspects of subordinate rivalry and petulance amongst the considerably strong Allied military personalities in Europe.

The choice of Tedder to frame strategic guidance as his deputy[13] was equally prescient;[14] he was the ideal grit in this particular oyster. Both placed the overall campaign above individual interest. Significantly, Tedder's war record in promoting Air-Land Co-operation in the Western Desert matched his abiding commitment to overall combined operations. Tedder had won the army's confidence as evidenced in General Auchinleck's letter to Churchill in the prelude to Op CRUSADE.[15]

Coningham was at that time an AVM commanding the Western Desert Air Force. He supported Tedder in shaping the application of air power in support of land forces and identified lessons in C2, targeting, ground force identification and timeliness. These were implemented successfully at the Battle of Alam Halfa, the 'pinnacle of WWII Land/Air co-operation' and 'crucible of jointery',[16] in Aug/Sep 1942. Co-located with the then Lt General Montgomery commanding the 8th Army, at his Army Advanced HQ, Coningham re-established the art of air support to the army, which had been forgotten between the wars.[17] This set landmark procedures and organisation that were to deliver the combination of battle-winning air support and air superiority at the 'Second Alamein' and later into Sicily and Italy. With his distinctively trenchant, clarion enunciation of doctrine Montgomery subsequently set out the 'great principles' of air and land co-operation in 1943.[18] Later on the eve of Normandy in May 1944, he stressed in writing to his subordinate Lt Gen Dempsey that air and land commanders should 'get to know each other, and get that understanding of each other's problems which will be the firm foundation of mutual confidence and trust when we begin fighting'.[19] No one today would cavil with any of Montgomery's precepts here, which chime with our joint command doctrine. Unfortunately his behaviour in Normandy ran counter to his rhetoric, but the system was fortunately robust enough to survive. In the latter stages of the war in the

desert, Montgomery' boastfulness alienated Coningham[20] who, along with Tedder, also felt that Montgomery faltered in making use of the air forces in pursuit of Rommel across North Africa after Alamein.[21] Their disquiet over Montgomery's hesitancy was to re-surface over the securing of Caen with its implication for airfields needed to support the campaign continuance. Tedder and Coningham also harboured bitter memories of Montgomery's failure to appreciate the "war for aerodromes" in Sicily.[22] The judgements of the official British historians of the Mediterranean and Middle East campaigns[23] substantiate Coningham's practical Air-Land co-operation pedigree and commitment to its furtherance. Sadly, the progressively corrosive nature of the personality clashes meant that successful lessons of co-operation in one campaign were not transferred to another.

Elsewhere, Coningham, supported by Tedder and Portal, had little regard for Spaatz's professional abilities having had occasion to brusquely challenge his interference in Coningham's Command in Italy in 1943.[24] Although it is not apparent in other works, D'Este[25] records that Broadhurst felt Coningham's 'personal and vehement anti-Montgomery attitude adversely affected air operations and [Broadhurst] resented being in the middle of a personal squabble'.

Leigh Mallory's background was in fighters. A cautious pessimist, he held little trust or popularity amongst his British or US aviation peers. In his defence, at heart he was fully behind the main campaign effort. However, his judgement and relationship with Park in the Battle of Britain had been questionable[26] and his manner with Allied colleagues fostered resentment to the extent of their seeking his removal.[27] In chairing an OVERLORD Allied Air conference on targeting and strategic/tactical effort allocation on 23 May 44, he declared that British operational methods should have primacy and called for the immediate relief of all US officers in the War Room.[28] Together with the vague mandate of his ill-defined command role, these factors made him an invidious 'fifth wheel on the wagon'[29] in the command structure.[30]

But it was not all sour. In the Middle East, Tedder and Coningham established command and confidence building relations with Major General Brereton[31] who was to work under Coningham in Normandy. In Coningham's presence, and in response to a question on Army air support availability by Eisenhower during planning, Major General Quesada is also recorded as stating that co-operation between US and British TAF was so close that somebody would be found to help.[32]

The Allied air campaign

'The attainment and maintenance of an air situation in which the German Air Force would be incapable of interfering with the Allied landings.'[33]

In his directive of 17 April 1944,[34] Eisenhower listed the tasks for the Allied Air Forces: to assist the Allied armies in establishing a lodgement; to maintain the combined bomber offensive; to secure and maintain air superiority; and to attack rail communications in the OVERLORD area. From these, the Allied air campaign was drawn in three phases. The first two phases were essentially independent air actions. In the first Allied fighters were to gain air superiority.[35] This was tied to the POINTBLANK Directive in attacking the German fighter forces and their support and was largely achieved by the end of February 1944.[36,37] The second phase started in March and aimed to shape the battlespace in support of the land campaign. Named the 'Transportation Plan', it was linked into the deception plan Operation FORTITUDE. It isolated northern France by interdicting all German reinforcement[38] transportation links to Normandy while masking the invasion location. The wider air contribution to deception had a number of other facets.[39] The third phase sought to exploit the lodgement and assault and called for Air Forces to provide the Army with Air Support. It sorely tested air/land co-operation. However, disagreements started with the allocation and application of Air Power to interdiction under the Transportation Plan.

B-17s on a bombing run over Germany

The Transportation Plan depended on bombers, first to destroy infrastructure and then to interdict the movement of German troops once the invasion started. Tedder, its strongest advocate, supported by Leigh-Mallory and Coningham, convinced Eisenhower of its necessity

Command discord — indirect support[40] (interdiction)

"Now listen Arthur [Tedder], I am tired of dealing with a lot of prima donnas. By God, you tell that bunch that if they can't get together and stop quarrelling like children, I will tell the Prime Minister [Churchill] to get someone else to run this damn war. I'll quit". [41]

Disagreement on interdiction centred on the interpretation of the Centre of Gravity. With relative autonomy over their separate strategic bomber commands, both Harris and Spaatz retained an absolute belief in the power of the bombing offensive[42] to the extent that they believed such lines of operation would eliminate the need for what they saw as a risky OVERLORD plan. Harris remained fixed on bombing German cities and Spaatz considered that his 'Oil Plan' could best contribute to a German surrender through the destruction of oil and fuel production sites by his forces. Whilst they eventually saw a responsibility to support the invasion, their agenda still made them reluctant to be brought under Eisenhower's direct command.

However, invasion success hinged on preventing the movement of reinforcements to the Normandy area — it was a decisive point in our parlance. The Transportation Plan depended on bombers, first to destroy infrastructure and then to interdict the movement of German troops once the invasion started. Tedder, its strongest advocate, supported by Leigh-Mallory and Coningham, convinced Eisenhower of its necessity. It was opposed initially on strategic and political grounds by inter alia the bomber commanders and Churchill.[43] The bomber commanders did not want to make the prolonged commitment required and offered a more limited pre D-Day interdiction programme. In inclining more towards the bomber commanders, Churchill was also alive to the unintended jus in bello ramifications.[44] Eisenhower lobbied Churchill, Roosevelt, General Hap Arnold, Portal, and even the French Committee of National Liberation[45] to try and gain approval for the plan and the assets to achieve it. Portal and Arnold were particularly reluctant to reassign OPCOM of their bomber forces. The decision ultimately lay with the CCS and he felt strongly enough to threaten to resign his post if the plan was dismissed. Mindful of the debate on both sides, the CCS took a median line and assigned him 'direction' rather than command of strategic air forces. This achieved the aim, albeit adding a further dimension to the already complex Allied Air C2 structure that Tedder had to manage. Even after the war debate ran on the efficacy of this plan.[46] However, statements from the German command indicate that the interdiction campaign

had ruined their counter-offensive plans[47] before the Allies waded ashore. In effects-based terms, and in the words of Rommel and von Runstedt, it 'paralysed'[48] German mobility and thus reduced their tempo. The plan met its aim and all the evidence supports Tedder's assertion that it was a decisive point along the campaign lines of operation.[49]

Command discord — direct[50] air support

The third phase brought the combined maladies of poor C2 and personality clashes into sharp focus. This paper illustrates the effect of personality and C2 problems in respect of arguments that arose over Caen and airfields, and poor co-ordination with resulting fratricide in Operation COBRA

The question of airfields

'If our strongest card, overwhelming air-power, was to be played effectively and promptly, we had to have airfields in France . . . We must, therefore, have enough airfields around Caen and areas west of Paris to operate over the Seine in strength'.[51]

There was no carrier support and a need to shorten the air transit time from England after securing the lodgement. Resurrection of the Op HUSKY lesson on provision for the speedy capture of airfields brought Tedder and Coningham into conflict with Montgomery. Their frustration, shared by Leigh-Mallory,[52] largely centred on his ambivalence rather than the over-caution they felt he had shown at El Alamein.[53] Montgomery's statements at his first Ground Commander's conference at St Paul's School in January 1944 stressed the need for five British brigade-landing groups because of the 'urgency of securing airfields in the British sector'.[54] As planning progressed, the immediate post-invasion mission assigned to the 2nd Army was to take Caen, which he predicted boldly by Day 1. This chimed with the airmen's airfield objectives since ideal open flat airfield country lay to the south and east of the Caen-St Lô line, beyond the highly unsuitable constrained bocage. Montgomery's statement 'so we get increased air support — so everything becomes easier'[55] made as late in the planning as March and April indicates that he understood precisely the significance of this for operational tempo. Dempsey certainly cascaded this as Main Effort in his intent to the 2nd Army.[56] All this would be consonant with our modern manoeuvrist approach to shape, attack, protect and exploit, but it did not transpire this way

Post-lodgement, the air commanders became increasingly perturbed with Montgomery's lack of progress towards their immediate objectives around Caen. Every day without it denied in-theatre availability of tactical air forces and diluted the leverage of their overwhelming aerial advantage. Without the airfields, cross-channel transits and long supply chains added to the burden of maintaining air superiority from a distance. Six days after the invasion only three landing strips in the lodgement had been made available for Coningham's TAFs and Leigh-Mallory raised his concerns that advantages of early surprise would be lost as the Germans gained time to consolidate. The Germans certainly understood the significance of Caen and defended it fiercely for weeks. There was therefore understandable delay in taking the objective and better relationships would have brought better mutual understanding. However, Montgomery only showed insensitivity and condescension towards his air colleagues, typified in his statement that 'Coningham wanted the airfields in order to defeat Rommel, whereas I wanted to defeat Rommel in order, only incidentally, to capture the airfields'.[57]

Coningham was openly blunt in expressing his exasperation to his fellow commanders[58] and considered that Montgomery had once again been prevaricating if not remiss in delivering his intent and even suggested that Montgomery tried to deny the existence of the plan.[59] Whatever the truth, Montgomery certainly fuelled discontent with the airmen in running to a form they had seen before and remaining obdurately insistent that everything was running to his 'master plan'.[60] Matters became further strained when Leigh-Mallory, following a blast from Montgomery on being 'gutless' in failing to support an airborne assault, and seeking a way to assist, visited Montgomery without consulting Tedder or Coningham. He proposed using strategic bombers

in direct support of ground operations around Caen. Montgomery was most enthusiastic,[51] but Dempsey demurred - perhaps he was mindful of the lessons of Cassino. Having become aware of the proposal, Tedder and Coningham broke up a meeting at Dempsey's HQ to overrule this plan. Leigh-Mallory was chastened, and Montgomery reminded by Tedder that Coningham not Leigh-Mallory was his opposite number and Broadhurst was Dempsey's. Montgomery acknowledged this but paid scant attention to obeying it.[52] The fact that Montgomery was absent when Tedder and Coningham visited was indicative of his condescending line that he was too busy to discuss Air/Land matters, which should be dealt with by his subordinates. Unfortunately many of his staff lacked the experience in this arena. So with no daily contact between Coningham and Montgomery, and Montgomery continuing to deliberately avoid Coningham in favour of Leigh-Mallory, there was neither mutual trust nor confidence.

Recriminations continued well into July with Eisenhower having to step in and remind Montgomery to work with Coningham; Montgomery lobbying Eisenhower, Tedder and even General Alanbrooke, to sack Coningham; and Tedder, backed by Portal, advising Eisenhower, if necessary, to sack Montgomery.[53] Whilst Portal eventually eased Leigh-Mallory from his post; in respect of others, as one historian has observed, 'He whom propaganda has made mighty no man may readily cast aside';[54] High profile commanders at the pinnacle of their careers, and especially those who have achieved a cult hero status of national significance cannot be cast aside easily or quietly. The wider interest of Service as well as national morale rendered Montgomery and Harris impossible to remove. However, the result within the higher command was a breeding ground for suspicion[55] and Air/Land co-operation was at its nadir with no supported/supporting commander ethos at the operational level. Coningham did, however, get co-operation from the Army airfield construction groups who worked to their limits in the circumstances and allowed him to take risk to his own forces by concentrating more aircraft on each airfield than was originally planned.[56]

Close Air Support — Operation COBRA

'When you read of all the great glamour of our flying friends, just remember that all that glitters is not gold!'[57]

Poor Air/Land co-ordination caused fratricide in Operation COBRA. This was an American southerly breakout operation in the St Lô area. General Bradley and Leigh-Mallory were the key commanders involved. The plan was for bombers to precede ground operations on 24 July by opening up a gap for the US VII Corps in the German defences in front of the ESE line of the St Lô-Periers road. Bradley personally attended the conference at Leigh-Mallory's HQ to outline his intent and gain agreement to approach limitations for the safety of his people close to the objective. Bradley insisted that the bombers must attack east-west, out of the sun and parallel to the road.[58] As his forces would be north and parallel with the road, the risk from Allied 'short-bombing' errors would be reduced. The air commanders favoured a perpendicular approach for bombing accuracy and time to sequence their bombers through the area on a broad front, which could not be achieved in a limited corridor approach in the one hour allocated. Bomb craters had stalled Montgomery's advance in Operation GOODWOOD, so Bradley asked for small fragmentation ordnance. The safety distance for own-troops was also debated and a close 1,500 yards was eventually agreed. Bradley believed that he had agreement from Leigh-Mallory on an attack direction parallel to the road. However, the orders issued to the 8th Air Force were ambiguous; 'routing and altitudes of air formations were to be coordinated directly between commands'[59] and 'bombardiers were not to drop short' which could be interpreted as an instruction to adopt a perpendicular approach.

Despite an unfavourable meteorological forecast, the air forces took-off on 24 July but were then recalled by Leigh-Mallory as the forecast proved accurate. Over 1,500 were airborne and several hundred had dropped their ordnance on a perpendicular approach before the recall order was received. The fratricide amongst US ground troops was considerable and eventually totalled 101 dead and 463 wounded.[70] Bradley was furious

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when the bombers appeared from the north behind his troops rather than from their flank, and regarded this as a serious breach of good faith by the air forces.[71] Bradley was unable to talk the air commanders into changing their plans at short notice, and did not want to delay or cancel COBRA. Therefore he allowed the operations to continue on 25 July. Again, mistakes added to casualty numbers, although General Lightening Jo Collins in command of US VII Corps sensed German culmination and launched his infantry and then armoured reserve to deliver the breakout. Subsequently US Army commanders remained pessimistic about the ability of heavy bombers to provide tactical support, although airmen including Leigh-Mallory remained enthusiastic.[72] Whilst the official investigation did not lay particular blame; poor integration and co-ordination in air and ground planning were undoubtedly decisive factors leading to 'short' bombing and fratricide. Lack of adequate liaison, mutual understanding, or even sympathy between air and ground staffs, led to misunderstandings on such basic planning presumptions as the bombers' approach to their targets.[73] This remains a lesson for today.

So, to what extent did personality clashes and poorly defined command roles affect air-land co-operation in Normandy?

'History insists that the last word, in regard to the Battle of Normandy, must be that the quarrels did not, finally, matter. . . But let us be quite clear . . . what made the ultimate victory possible was crushing air power. It is not pleasant to think what might have happened without it'.[74]

Object lessons in pitfalls for 'inter-component' cooperation endure from this campaign. It is true that success was achieved, but co-operation was certainly emasculated by personal aggrandisement

at the Operational Level, and the execution of a difficult campaign was made unnecessarily harder by failure to implement the co-operation and co-location lessons learned in the Western Desert. Direct Air Support took two months to match the standard achieved in North Africa in mid-1942. When bound in with an unwieldy C2 structure, personality clashes brought inexcusable, and at times disgraceful, internal fighting that had an incredibly destructive impact on 'inter-component' co-operation. It takes two to quarrel and there was bad behaviour on the part of senior Air and Land Commanders alike, coloured by previous experience between them that corroded mutual trust. However, as senior Allied air commanders wrestled with their role in Montgomery's scheme of manoeuvre, evidence marks the latter as bellicose, Machiavellian and arguably reckless, given that this was a pivotal campaign on which the war hinged. He relegated the air commanders to the role of advisors not equals.[75] Fortunately, tactical Air/Land relationships proved more harmonious. Broadhurst, working alongside Dempsey's 2nd Army in the British sector; and Quesada, responsible for providing air support to Bradley's American armies, worked hard to keep their respective land commanders aware of the air situation. There is evidence too of fixation on planning for the invasion at the expense of follow-on operations; this was a lesson seen elsewhere such as Guadalcanal. Montgomery ran his campaign planning in a linear fashion and so failed to synchronise land operations and airfield provision that was, by his own earlier statements, critical to achieving tempo in expeditionary operations.[76]

It is inevitable that some high-value air assets will not be permanently allocated to the joint task force commander. The lessons here show that when they are, then one air component commander should centrally control them.

Personal egos can undermine a campaign's main effort and hence, the supported/supporting command relationships. It was fortunate that the Supreme Commander and his deputy exercised consummate strong and politically astute leadership; however, they should not have had to intervene to prioritise and adjudicate on issues to the level brought about by personally motivated differences of opinion. Liaison officers also lacked experience and this was a weak link, since their employment and effective communication was crucial. This was especially so in Normandy where the commanders were not listening to each other.

Finally, COBRA and its aftermath is a reminder that 'mistakes and 'blue on blue' cast very long shadows, and trust can take generations to rebuild.[77]

To what extent does current doctrine and command training equip the joint force for today's air-land battle?

'There is not a clear and commonly agreed view of how land and air components interact in a joint campaign. We assume interaction and synergy; but such concepts are not adequately described in joint or land doctrine, despite many detailed descriptions of mechanisms…The Army and RAF need to define and make explicit how land and air operations interact, and how they contribute to campaign success'.[78]

Commanders' personalities will always produce an influence on operations; after all, leadership characteristics are in part drawn from personality. However, there is now a healthy emphasis in developing joint capability and personal and mutual understanding of inter-component contributions, capabilities and requirements. These are now fostered at the staff level by education at ACSC, and at the operational level by the HCSC reinforced by the CJO led Joint Force Command Group (JFCG) and J7 training.

This is just as well, since the UK now has an increasingly expeditionary focus in coalition operations of choice. These demand, inter alia, more flexible use of Air Power with a responsive C2 organisation and technology that can integrate in a networked environment for joint effect.

At the operational level, lessons from the 1991 Gulf War[79] and Allied Force (1999),[80] that are not dissimilar from the Normandy campaign in terms of co-ordination problems, identified the

EA-6B Prowler takes off during Operation Northern Watch, enforcing the no-fly zone in Northern Iraq

Organisational structures are improving and we are becoming more sophisticated in our ability to use all forms of air power in support of land forces

need for a core deployable UK JFAC HQ and not just a CAOC. Training and development in this capability with the aim of delivering centralised C2 at the highest practicable level is now fast maturing. This will plan, task and execute the theatre joint air mission and through apportionment recommendations to JTFC, deliver the best utilisation and de-confliction of air assets in a campaign. However, there remains much to be done. Common doctrine is not fully developed or understood; some equipment is inadequate, with poor interoperability; and critical structures within the ORBAT are missing or undermanned. Project CONINGHAM-KEYES, (PC-K) is a tri-Service initiative set up in late 2003 to address these issues.

As an example, at the tactical level,[81] Op TELIC Lessons and the DOC Offensive Air Support Audit identified a requirement for better Air/Land integration to restore tactical interoperability. There is a noticeable gap in the ability of UK forces to provide an effective C2 system for tactical air. The inadequacy of current Joint Air Support Organisation (JASO)[82] provision within formation headquarters was highlighted by the requirement for a USMC-supplied Air Support Element (ASE)

which augmented HQ 1 Div in order to provide the necessary C2 interface with their supporting air elements. PC-K has recommended the creation of a Tactical Air Control System (TACS) to re-establish the Tactical level air C2 lost at the end of the Cold War. Concurrently it also sees development of the JASO into the Joint Air Land Organisation (JALO) to provide a more powerful FLC Joint Focus Organisation and a more robust Tactical Air Control Party (Forward Air Control) structure. It is proposed that the JALO should have specific responsibilities across the all the Lines of Development and that to have maximum effect in the areas of greatest weakness, it should be within HQ LAND, possibly under the LWC.

In tandem, training must be adapted for likely operations with more air/land joint emphasis. In particular, more land training is required with US air forces (Marine and USAF) since it is likely they will support UK land forces as during Op TELIC. Exercise JOINT VENTURE in Nov 04 has also demonstrated the value of reintroducing the Air Support Operations Cells (ASOCs) into the C2 structure.

Envoi

'There is no place in the battlespace areas where land air forces operate without air forces, although there are places where air forces operate without land forces. Therefore at this tactical level, activities should be integrated in time and space wherever they interact; and co-ordinated where they do not'.[55]

Broadhurst and Quesada would have understood the quote above. Reinforced by more positive shared experiences and better training in recent times, strategic and operational Air/Land commanders are now more attuned to each other's concerns and share trust and a developing common taxonomy. Many of Tedder's, Coningham's; and even Montgomery's pronouncements in his more co-operative moments, are relevant for us today. Healthy debate must also continue about the achievement of required effects, but organisational structures are improving and we are becoming more sophisticated in our ability to use all forms of air power in support of land forces. Precision-guided weapons delivered by B-52 and B-1s close to our own forces in recent operations demonstrate that we have the techniques to lay the ghosts of COBRA to rest. However much remains to be done, and the appetite to address the Air/Land lessons under PC-K must be encouraged.

Notes

1 Lao Tzu, Chinese Taoist philosopher, b.600 BC

2 Hamilton (1983) p 745

3 Tedder (1966) p 607 Although as we no know, it was not quite as 'simple' as Churchill surmised.

4 POINTBLANK - June 1943 Anglo-American Directive priority commitment of Strategic Air Forces against the Luftwafe and industrial targets sustaining them. SHAEF and AEF were seen by Spaatz and Harris as a problem to their POINTBLANK authority.

5 Terraine (1985) p612

6 Both were to revert to single-hatted roles once forces were ashore.

7 D'Este (1983) p219

8 Commanding 83 Group and working with Lt General Demsey's 2nd Army

9 Orange (1990) p 187 drawing on the records of Scarman, Tedder's diarist.

10 ibid

11 ibid p166 Montgomery writing to his COS, de Guingand

12 Cook (1976) p514 describes this as a 'deep, visceral dedication and determination to make Anglo-American co-operation a living and working reality'

13 Foxley Norris (1976) 'Eisenhower's own relationship with Tedder was perhaps the most closely integrated of all'.

14 Richards and Saunders (1974) Vol ii p227 state that in earlier operations as AOCinC Middle East, 'Inter-allied relationship was Tedder's *forte*'

15 Terraine op cit p355-356

16 Dr Christina Goulter presentation to HCSC 05 - Historical Perspective of the Air Power Component

17 Although lessons, implemented by the Germans, had been evident during the Spanish Civil War.

18 Reproduced at p380 Terraine op cit

19 D'Este op cit Appendix A has a full photocopy reproduction of this letter dated 4 May 1944.

20 ibid p218. Coningham believed Montgomery had 'stolen recognition away from himself and his air force after Alamein'.

21 Terraine op cit p386-387

22 ibid p569-570

23 Orange op cit p178 includes: 'he never for a moment forgot the land forces' and devised for them methods of providing a tremendous direct support which applied familiar principles in a new and most effective way'. . .'never to be bettered . . . until the end of the war'

24 Orange op cit p173

25 D'Este op cit p219

26 Terraine op cit p203-205

27 Orange op cit p198

28 ibid p192

29 ibid p214

30 Both Terraine op cit p 609 and D' Este p217 draw on a quote from Professor Solly Zuckerman, which, sympathises with Leigh-Mallory's plight, but concludes it was 'simply not his world'.

31 Terraine op cit p 384.

32 Orange op cit 186

33 Craven and Cate (1983) vol 3, p138. Primary mission in the air plan for OVERLORD

34 Rostow (1981) p6-7

35 Lessons of Salerno and Anzio defined as that degree of dominance in the air battle of one force over the other which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force.

36 On D-day, the Allies flew 14,000 sorties as opposed to 100 the Germans managed to put in the air.

37 Vogel (1994) 'If its white, it's American, if its black, it's British, if you can't see it, it's Lutwaffe' — quote by German soldiers

38 There were 58 German divisions in the west. Their strategy was to counterattack against any invasion with a mobile reserve under Rommel's command.

39 Goulter (2000) p195 describes the '2-for-1' strategy in which two targets outside the invasion area would be struck for every one inside the invasion area.

40 Support given to Land forces against objectives other than enemy forces engaged in the tactical battle, ie Air Interdiction

41 Irving (1981) p81 Eisenhower Telecon to his Deputy on 6 March 1944, as reported by General Patton visiting at Bushey Park.

42 Terraine op cit p 608

43 Pogue (1954) p127

44 Tedder op cit p530 Churchill was concerned about collateral French casualties: 'You will smear the good name of the Royal Air Force across the world'. This was a powerful moral issue and potential German propaganda opportunity.

45 Ambrose (1994) p97

46 ibid p98 Quotes official US Army Air Force historians, Craven and Cate,' Long after D-Day, there remained the sobering question as to whether the results of the plan were commensurate with the cost in air effort and the ruin inflicted on French and Belgian cities'.

47 Pogue op cit p 132

48 Warden (1988) reproduces evidence of von Rundsted, von

Kluge, Rommel and Colonel Hoffner, in charge of railroads in von Rundstedt's area.

49 Ambrose op cit p99

50 Air support intended to have an immediate effect on current land operations

51 Tedder op cit p549-550

52 Lamb (1983) p 80

53 Terraine op cit p 615

54 ibid p65

55 Terraine op cit p 614

56 Terraine op cit p616

57 Terraine op cit p618

58 Orange op cit p199

59 Orange op cit p198

60 Terraine op cit 619

61 D'Este op cit p226

62 Orange op cit p199

63 Orange op cit p203-207 catalogues the correspondence in this degenerative squabbling.

64 Hastings (1984) p 243

65 Terraine op cit p619

66 Orange op cit p198

67 Hastings op cit p254 quoting Brigadier General William Harrison of 30th Division.

68 ibid. Also Hallion (1994) (Internet source) has a good map of this.

69 Sullivan(1988) p101

70 Gooderson (1998) Appendix Tables p251

71 D'Este op cit p 401

72 ibid p 403

73 Gooderson op cit p150

74 Terraine op cit p 619

75 Terraine op cit p611 quoting Chester Wilmot

76 Goulter(200) op cit p197

77 Dr Christina Goulter presentation to HCSC 05 - Historical Perspective of the Air Power component

78 DGD&D/2/400 dated 20 NOV 03

79 No effective deployable air C^2 capability - Ineffective air/land/maritime coord at theatre level - Limited understanding of air warfare at all levels - Poor understanding of the military planning process Source: JFAC presentation on HCSC05

80 Ineffective ad-hoc augmentation - 'Flying programme' approach to air ops - Ad-hoc, 'target-centric' air ops planning- Day 40 before coherent air strategy produced -Failure to integrate Information Ops - Failure to co-ordinate between components Source: JFAC presentation on HCSC05

81 'Tactical level Air/Land issues' sit below the JFAC effort and concern air operations within the airspace of the LCC and in direct support of land forces, and specifically the integration of CAS/AI into Land operations. GBAD except in their impact on Airspace Management

82 The C2 and responsibilities of the JASO are in DCI JS 72 2003 The JASO is a functional grouping of the maritime, land and air force elements involved in the provision of inter-component Air Support at the tactical level. The main elements are: Divisional Air Liaison Officers (DALO); Brigade Air Liaison Officers (BALO); Ground Liaison Officers (GLO); Tactical Air Control Parties (Forward Air Control) (TACP(FAC)); the Joint Forward Air Control Training and Standards Unit (JFACTSU); a Forward Air Control Standards and Evaluation officer (FAC STANEVAL); and a small headquarters element (HQ JASO) which is responsible for ensuring that the JASO is suitably resourced to meet its remit. This includes responsibility for manning, FAC training, standardisation, co-ordination of resources and

specialist equipment for ground FACs. In addition, HQ JASO can offer specialist advice on ALOs, GLOs and FACs, including on operational employment, continuation training and currency matters.

83 British Army Doctrine Publication – Land Operations - Post ADC Draft Dec 04 p 4-11

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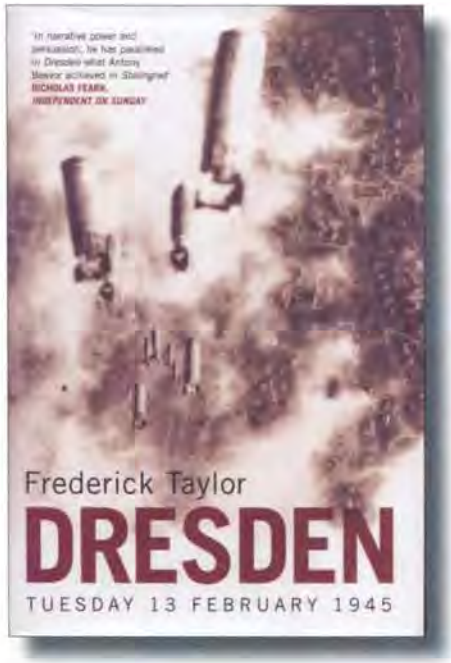


Dresden:

Tuesday 13 February 1945

By Frederick Taylor

Bloomsbury Publishing plc
ISBN 0-7475-7078-7
Price £20.00 (518 pages, hardcover)
Reviewed by Gp Capt Neville Parton

This is, appropriately enough, a big book to cover a big subject. Even 50 years after the event just the name of Dresden is enough to conjure up high emotions, and there can be few individuals with any interest in air power history who are not aware of both the raid and some of its outcomes. This book, however, contains within its pages a great deal more than simply an exposition of the details of the raid on Dresden and its terrible consequences. Instead, the reader is treated to a number of different, intertwined histories: that of the development of area or 'terror' bombing, the history of Dresden itself, and, after an in-depth consideration of the raid, a clear examination of the various post-war 'revisions' of the Dresden story.

The book is divided up into 3 major sections, roughly corresponding to events leading up to the attack of February 1945, the actual raid itself, and the aftermath, in both the short and longer-term. The first part examines the history of Dresden from its transformation under King Augustus II of Poland through to the Nazi party's coming to power in the early 1930s, before examining the conduct and practice of war from the air — from theoretical considerations through to applied experience of the Luftwaffe and the RAF – before considering the actual status and condition of Dresden in early 1945. The next section considers the raid in all aspects: British and American attacks and the consequent results on the ground, laid out in an hour-by-hour account of the city's destruction. A detailed analysis of the consequences follows in the last part, covering the actual destruction wrought and numbers of casualties caused, and tracking the ways in which the latter developed as part of firstly Nazi, and then later Soviet, propaganda exercises.

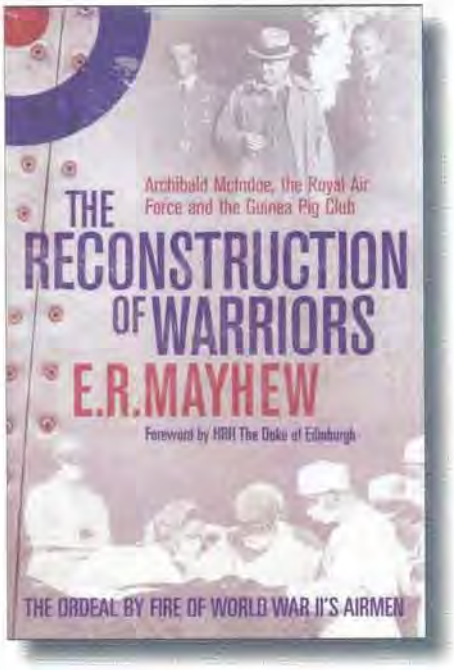
This is not a simply a grand historical treatise though. The human dimension is brought into sharp focus throughout, with the interspersal of survivors' stories — both from the air and the ground — between the largely unemotional official reports. Some of the most fascinating are those from certain of the few remaining Jewish individuals in Dresden, most of whom were employed on work in the secret or hidden armaments factories. Perhaps the most horrifying realisation is that the Dresden raid really was not particularly special: the course of the war had lead to the strategic bombing campaign as being one of the few ways in which the Allies could strike back, and Dresden stands

out mainly because of the way in which a whole sweep of contributory factors — the lack of any effective German anti-aircraft units, the weather, and so on — led to the conditions that enabled the firestorm to be created.

In terms of compressing so much history, and laying bare so many myths, this is without doubt a tour de force. But perhaps its greatest strength is that no one with any sense of morality can read it and remain unmoved. Dresden was without doubt a beautiful city, possessed of a proud history, but at the time of the raid it was also considered a perfectly legitimate military target. And Bomber Command, as the instrument of the British people, had been carefully developed to the point where it could produce destruction on a truly industrial scale. The point made by the author throughout is of the inevitability of the event occurring — and if it had not been at Dresden it would have occurred somewhere else. Indeed arguably there were far worse raids in terms of percentage of the population being killed, but for a number of reasons, including both Nazi and later Soviet propaganda, Dresden has come to stand out. This work is, both as a debunker of myths and an exploration of the tragedy of war, a book that should be widely read by RAF personnel of all ranks.

In this case it is without doubt best to leave the final word to the author:

'The bombing of Dresden was not irrational, or pointless — or at least not to those who ordered and carried it out, who were immersed deep in a war that had already cost tens of millions of lives, might still cost millions more, and who could not read the future. Whether it was wrong — morally wrong — is another question. When we think of Dresden, we wrestle with the limits of what is permissible, even in the best of causes.'



The Reconstruction of Warriors:

The Ordeal by Fire of World War II's Airmen

By E R Mayhew

Greenhill Books, London
ISBN 1-85367-610-1
Price £18.99 (239 pages, hardcover)
Reviewed by Gp Capt Neville Parton

It has been described as the most exclusive Club in the world, but the entrance fee is something most men would not care to pay and the conditions of membership are arduous in the extreme.

Books

Whilst the story of the Guinea Pig Club may be known to some of the current generation of airmen, it is probably not as widely recognized as it should be. This remarkable book goes some way to ensuring that not only the Club and its members are commemorated appropriately, but also puts their achievements into a far broader context. For those readers who may not be aware, the Guinea Pig Club consisted of those individuals, predominantly (although not exclusively) from the Royal Air Force and Allied Air Forces, who as a result of their severe burns injuries were treated at East Grinstead hospital by the remarkable surgeon Archibald McIndoe.

Written by a historian who is also the grand-daughter of one of the nurses at East Grinstead who worked with Sir Archibald McIndoe, the book takes us from the care of burns patients in the 1930s, where those seriously burnt were simply dosed with morphine and sent home to die, through to the post-war history of the 647 members of the Guinea Pig Club. It begins by considering the unique set of threats posed to aircrew in particular during World War II, when aircraft had begun to carry large quantities of aviation fuel as well as other explosive substances such as gaseous oxygen and of course ammunition and bombs. The problems that this cocktail posed to aircrew survivability had been recognised by the Air Staff before the war, but the limitations of materials in the 1930s meant that self-sealing petrol-tanks were not available for fighter aircraft until around 1940.

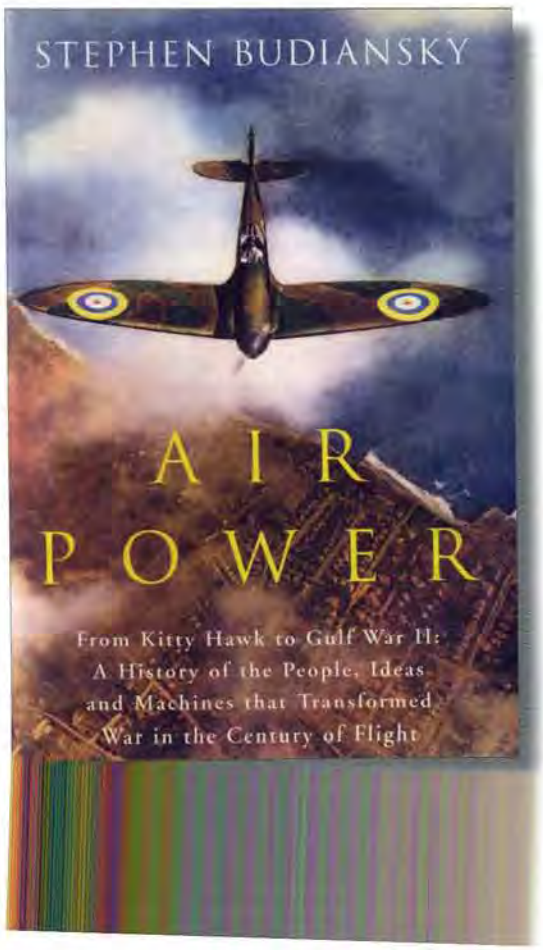
It then moves on to consider actual incidents during the Battle of Britain, seen through the eyes of survivors, and explores a particular problem experienced by Hurricane pilots – the so-called 'Hurricane Fire'. However, this section simply acts as an introduction, explaining how these individuals ended up at East Grinstead before moving into arguably the less well known elements of the story, examining how the treatment of burns developed during the war, and especially the role of McIndoe in this field. Early treatment consisted of tannic acid which provided a chemical dressing over the wounded area, but whilst this worked acceptably on small burns, it was completely unsuitable for the large areas of burns resulting from exposure to intense fires which aircrew tended to suffer from. Not only did it leave the skin in a condition that was unsuitable for further reconstructive work (plastic surgery), it also severely affected an individual's chances of survival, and one of McIndoe's earliest battles was to persuade the medical establishment that alternative treatment methods were urgently required. The description of the medical procedures is fascinating in its own right, but McIndoe's vision that it was treatment of the whole person that was required stands out in terms of the factors for overall success. And of course this meant more than just having the right medical staff and environment — the response of the local community was also of fundamental importance.

The book then moves on from the Battle of Britain to the rest of the war, and into the world of the bomber crews, who in the end made up 80% of the Guinea Pig's numbers. The special case of the Canadians is considered, who ended up building their own wing at East Grinstead, together with the experience of Guinea Pigs in POW camps, and the role of Major David Charters of the RAMC who performed minor miracles in looking after seriously injured POWs with frequently the most rudimentary of facilities. Another largely unknown part of the story is that of the then Chief of the Air Staff, Air Chief Marshal Portal, who provided tremendous support to McIndoe in his battles with authority — whether regarding the right of patients to wear uniform, or ensuring that they were entitled to full pay and allowances until either they could be returned to service or their treatment was completed.

The finale is provided by an exploration of the experiences of a number of Guinea Pigs since the war, from which it is clear that whilst their bodies were so injured during the war, their indomitable spirit most definitely was not. The courage and resilience amongst these individuals was truly remarkable: a significant number of them returned to flying duties after their treatment had finished, although even here the remarkable sense of humour evident amongst those who had passed

through East Grinstead left its mark, as many of them would carry a card with the instructions that 'In case of further trouble deliver the bits to Ward III, East Grinstead'.

There are few enough books around dealing with this remarkable story, and most of those that do are out of print. As a book which covers this particular area in great detail and with such authority, yet remains thoroughly readable, it is difficult to recommend it too highly to anyone who has an interest in the story of Second World War airmen beyond the public image. Dr Mayhew has done justice to all those represented in her book, be they airmen, doctors, nurses or even just the inhabitants of East Grinstead — do take the time to learn from their experiences.



Air Power From Kitty Hawk to Gulf War II:

A History of the People, Ideas and Machines that Transformed War in the Century of Flight

By Stephen Budiansky

London / New York, Viking Penguin, 2004.
ISBN 0-670-91251-4. Photographs

Reviewed by Sebastian Cox (AHB, RAF)

Broad historical surveys require an author with a broad and deep understanding of his subject. Stephen Budiansky lacks this essential quality. His main theme, that airmen have consistently been seduced by, and exaggerated, air power's strategically decisive effect, is hardly new and has been more convincingly argued elsewhere. Budiansky reduces it to caricature. Budiansky is so relentlessly negative, indeed snide, concerning any and all airmen who believed that air power could be applied strategically, from Lord Trenchard through to Colonel John Warden, that he ultimately undermines the credibility of his own argument. His villains are painted too black; his heroes, mainly fighter / tactical airmen (Dowding, Coningham, Quesada, Horner), are usually too white. The author tends to portray the latter as free-thinking individuals who buck a relentlessly misguided trend. This grossly simplistic interpretation grows out of Budiansky's lack of appreciation of context, be it political, economic, strategic, or industrial. Devoid of any