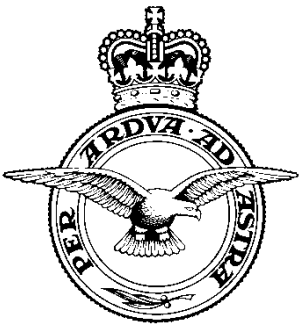
ROYAL AIR FORCE HISTORICAL SOCIETY



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Note: Due to pressure on space the names of Officers and Committee, the addresses of certain officials, and the usual final page giving notes about the Society have been omitted. The details shown in Journal 18 are still valid.

For the same reason Book Reviews have been held over.

ADDRESS TO THE ROYAL AIR FORCE HISTORICAL SOCIETY

By Air Chief Marshal Sir Richard Johns
GCB CBE LVO ADC FRAeS RAF
Chief of the Air Staff

Tuesday 23 June 1998

Chairman, members of the Royal Air Force Historical Society. I was greatly honoured by Air Marshal Baldwin's kind invitation to speak to you tonight. When I chose the subject for tonight's talk, I did so in the knowledge that it would be as a generalist amateur historian who would be speaking to experts in the field of Royal Air Force history whose knowledge is only too apparent from the Society's consistently excellent publications, which I must say I read with considerable delight. I thought, therefore, that, rather than either challenge your expertise or immodestly draw on my experience of the Service, it would perhaps be of greater interest if I considered the future of warfare using history as a handrail to guide my thinking.

Having considered the subject from a number of angles, I am led to conclude that the fundamental nature of warfare and its attendant characteristics still endure. Rather, it is the conduct of warfare that changes, driven by a variety of pressures: some technological, some political, and some social. Tonight I would like to make a somewhat flexible examination of these pressures and their consequences. So in asking you to be flexible and before I launch forth, perhaps a little story to illuminate the advantages of flexible thinking. It involves a university student who was studying Modern History. The first question on his exam paper was 'Discuss the differing aims and objectives of the British and Icelandic Governments during the Cod War.' The first paragraph of his answer read, 'I know very little of the aims and objectives of the British Government during the Cod War and even less about those of the Icelandic Government. I shall thus address the topic from the viewpoint of the Cod.'

I think it would be prudent if – at the great risk of teaching some of you to suck eggs – I started off with two assumptions, several definitions and a couple of concepts; but for no more than a few minutes I promise you. My first assumption, both simple and safe, is that wars will continue to occur where they are little expected. My second assumption, similarly safe, is that

warfare itself will continue to contain elements of the unforeseen and unexpected. As for definitions it is best to first consider conflict as a spectrum embracing a wide range of situations in which military forces may be required to operate, ranging from peace on the one hand to general war on the other.

So moving from peace to the middle of the spectrum we come to that rather grey and complex area embracing humanitarian aid, peace support operations and intervention operations. Beyond that, and at the far right of the spectrum I define general war as a major, unrestricted conflict in which national survival is at stake. While in the circumstances of today very few nations have the capacity to initiate such a war, there is always the risk that when major powers come into conflict the conduct of operations could escalate to general war.

During the Cold War the classification of limited war was used to describe international conflict short of general war in which there would be no use of nuclear weapons – the Korean War being a memorable example. However, in part due to the complexity of today's political landscape, contemporary conflict involving western countries is increasingly subject to the concept of limitation – such limits may be imposed by international law and conventions, such as the United Nations Charter and the Geneva Convention, which both legalise and regulate the use of military force.

Within this broad legal framework other more specific limits may be imposed by the choice of objectives, by placing restrictions on the types of forces and weapons involved, and by confining operations to designated geographic areas. All these limits can be carefully articulated in rules of engagement which specify the degree and manner in which force may be applied so as to ensure that the use of military power is carefully controlled.

To round off this overview, a few words on the concept of intensity. Most doctrinal publications I have read speak of intensity in terms of the frequency and degree of violence encountered in conflict. Frequency speaks for itself and relates to the tempo of operations, while degree usually concerns the destructive power of weapons involved and the level of violence. Relating frequency and degree to the spectrum of conflict we can conclude that low intensity operations relate to situations where the likelihood of violence (both frequency and degree) is assessed as low and high being where it is thought the likelihood of sustained violence is more than probable.

That said, I recently heard a British Army general with wide operational

experience define intensity of operations as the rate of consumption of resources, be they men, material or money. Such a definition permits a measuring of intensity that relates directly to the conflict as opposed to the equipment deployed, the numbers involved or the preparations for battle. It also allows for Commanders remote from the battlefield to recognise that for the man in contact with the enemy, all battle is intense and to plan accordingly. I like Gen Smith's definition – it is clear, pragmatic and is not open to misinterpretation.

Well, that's enough of assumptions and definitions and let me now try to give you a brief historical perspective of warfare and identify those elements of conflict that have not and most probably will not change.

I think we can all comfortably agree that the root causes of conflict are timeless and involve an amalgam of material considerations and human emotions embracing fear, greed, hatred and ambition. Similarly the fundamental character of conflict seems unlikely to change; it will remain a dynamic contest of wills involving death, destruction, chaos and uncertainty such that for the participants warfare will continue to represent the ultimate physical and moral challenge.

War is prevalent in history, one might also say inevitable. Since the end of the Cold War with all its emphasis on high intensity operations at the far right of the spectrum of conflict, we have moved into a new world era hallmarked by political instability, fragmented social structures, ethnic tensions and feeble economies. The problems generated by these tensions, previously concealed by the frozen international landscape of the Cold War, are now breaking through to the surface, and most have little prospect of quick resolution. Of some 40 active armed conflicts being fought around the globe in 1998 – that is a conflict where the parties involved must be in control of sufficient territory to sustain military operations – roughly ¾ are occurring within national boundaries between internal organised factions fighting Government Forces or each other.

As we move into the next millennium I think we can predict with some gloomy confidence that as the world population continues to increase, conflict over scarce resources vital to human life, such as food and water, becomes more likely. If warfare is inevitable, it is also collective because it is fought by one group against another, not necessarily of different nationalities, wherein what you are is often more important than what you believe – in such terms much of what has happened in the former Republic of Yugoslavia becomes comprehensible. War is self-evidently violent and

will continue to capitalise on violent human impulsions which already exist.

War generates its own friction – that force that resists all action and which makes the simple difficult and the difficult, seemingly impossible.

War is dynamic in that it moves all the time although with variable speed and changeable direction. Hence the enduring uncertainty of war, an activity in which there are no guarantees and I shall return later to the difficulties of prediction within the profession of arms. Meanwhile war remains an immensely physical and cerebral activity with the tempo of operations no longer constrained by night and bad weather, and with the intensity of violence created by modern weapons systems placing new and greater demands on war fighters at all levels and irrespective of the colour of their uniform.

Having thus identified uncertainty, chaos, violence, danger and human stress as perhaps the most enduring characteristics of warfare, let me now move on to consider pressures for change in the conduct of war.

The first and most obvious are technological. It remains a truism that if two opposing forces face each other, all other things being equal, the one with the better technology will win – that is as long as they exploit it to the maximum extent. But a breakthrough in technology is (at least until recently) a fairly rare event with most developments appearing as a consequence of scientists plying their trade of searching for something new rather than as a consequence of military demand. In the 7,000 years preceding the Industrial Revolution there were only five breakthroughs which produced totally new technology: copper, bronze, iron, the compass and gunpowder.

During the Industrial Revolution two new technologies emerged, steam and steel, which started the process of transforming warfare. Thereafter the internal combustion engine probably rivalled gunpowder in its importance, and the dramatic surge in military technology then continued to accelerate with the exploitation of airspace, with wireless/radio leading to radar and sonar, with V1 and V2 rocket missiles leading to space flight, satellites and another revolution in communications and reconnaissance.

Then we have the gas turbine engine, the helicopter, nuclear, chemical and biological weapons and the computer. Enough said, I think to underline the point that whereas prior to the Industrial Revolution a technological breakthrough came once every 1,000 years on average, they now come once every five with every prospect of becoming even more frequent. The

rate at which new technology is becoming available continues to accelerate. Just consider that if you are wearing a smart watch – hi-tech that is rather than just fashionable – I am told that it has more computing power than existed in the entire world before 1961. And, computer power is now 8,000 times less expensive than it was 30 years ago.

But, perhaps at this stage a word of caution – all of us with an interest in military affairs must be alive to the possibilities of technology and be on our toes ready to exploit the opportunities offered. But, being instinctively conservative by nature the track record of military professionals in identifying technological possibility and opportunity is not impressive. In drawing on some brief examples from the British experience to illustrate my point I must be truly joint so starting with the Senior Service, the Royal Navy. The Admiralty declared in 1828 that 'The Lordships find it their bounden duty to discourage to the best of their ability the employment of steam vessels as they consider the introduction of steam is calculated to strike a fatal blow at the Naval supremacy of the Empire.'

Turning to the Army, some 80 years later a War Office Memorandum declared that the War Office had decided to cease making any experiments with aeroplanes as the cost had proved too great. Moreover, and I quote, 'Aircraft were useless for Army purposes as it was impossible for anybody moving at more than 40 miles an hour to see anything at all.' In my own Service the then Deputy Chief of Air Staff declared in 1932 that no bomb heavier then 250 kg will ever be needed, while the recent death of Sir Frank Whittle reminds one of the grave concerns expressed by more than one air marshal over the practicality of Whittle's gas turbine engine.

I relate these stories not just to illustrate the inclination of the British Military to excessive caution when confronted with revolutionary new technology, but also to suggest to you the fear of equalisation – the fear that whatever you are very good at, your historical trump card, such as the supremacy of the Royal Navy in the age of sail, will be lost forever through technological innovation. Is there perhaps I wonder a modern parallel in contemporary efforts aimed at preventing the proliferation of weapons of mass destruction?

Having thus cautioned twice about the dangers of prediction I shall now probably shoot myself in both feet by attempting to do so. Also I'm jumping a little ahead of what I shall have to say later about politics and the media where I hope to show that the influence of both bodies on the conduct of warfare is also very much linked to developing technology. So,

that said, let me now briefly enumerate some of the more obvious military drivers for change of which the first and most obvious is whole life costs.

We can only afford so much and expenditure on military research must be concentrated on those areas of technology where there is no civil application – stealth, improved armour and cryptography are obvious examples. But whatever the system I cannot overstress the importance of reliability, maintainability and durability. My next driver is increased stand-off capability for weapons with pinpoint delivery accuracy – all to achieve maximum effect with minimum collateral damage and with minimum risk to the weapon carrier and launcher whether it be aircraft or ship.

We need at one end of the spectrum of conflict non-lethal weapons for peacekeeping operations, and at the opposite end systems that can provide defence against weapons of mass destruction. Other driving forces will probably include counter-terrorism, battlefield identification of friend or foe, stealthy platforms for land, sea and air, enhanced safety to minimise accidents and the continuing development of technology to take the place of, or assist, the human operator: by military trade I'm a fighter pilot with no scientific pretensions, but I can understand the relevance of each and every one of these military drivers.

But I'm skating on very thin ice of understanding when I recount the words of a well-informed friend who told me that if the 20th Century had been the age of the physicist, there is room to believe that the 21st Century will see the biologist and the geneticist come into their own. My friend believes that our understanding of how biological systems exist and interact with their surroundings will lead to totally new concepts of sensor systems, and adaptive and self-healing structures.

While all this is in the longer term, biotechnology may enable us in the shorter term to do things not previously thought possible and which will have application across the full spectrum of warfare. For example, chemicals to change the state of fuel and lubrication oils into solids, chemical and biological agents to attack transparencies such as cockpits and windscreens, high power microwaves to attack structures and equipment and low frequency sound to induce disorientation and nausea; but as I said earlier we can only afford so much which leads me neatly to space, the newest dimension of warfare.

We are of course already greatly involved in space. The Gulf War and current operations in Bosnia have highlighted our reliance on space and our need for assured access to space-based capabilities for battle damage

assessment, surveillance, mapping, targeting, meteorology, communications and GPS – the Global Positioning System – for navigation of aircraft, ships and armoured vehicles. And, do not forget that the use of space for navigation is now a crucial element in an increasing range of the most capable weapons systems.

Elsewhere, the use of space for intelligence gathering purposes is already largely taken for granted as we move inexorably towards 24 hour all weather observation in which the movement of targeted systems such as ships, APCs, tanks, aircraft and so on could be continually monitored to an accuracy of a few feet – all of which raises a multiplicity of questions about our attitude towards traditional readiness postures and the possibility of surprise attack.

But, I would suggest, there is more to knowledge of an enemy than precise information on the disposition of his forces. Of prime importance will be knowledge of a potential enemy's response to our attempts to deter or coerce and I venture that such assessments will be heavily dependent on the product of space observation, communications intercept and computer analysis. We must also be aware of our crucial dependence on space-based systems, many of which are vulnerable to attack, either directly or indirectly through EW.

To close the technological loop, I think you will agree with me that there is nothing simple about the march of technology. While we should remember that some apparently impressive advances deliver far less than they promise – the crossbow for example – practical problems of funding and procurement mean there is usually a clearly identifiable gap between what is technologically feasible and what is actually in service – and that gap may be widening. So where do we put our money for the best return in the next millennium, bearing in mind that weapons systems that come into service over the next 10 to 15 years are still likely to be in service in the 4th and 5th decades of the 21st Century?

While I have already described to you the military drivers, the litmus test will remain the issue of affordability, and this suggests new discipline to how we refine the operational requirements, and smarter procurement processes throughout system life. But, whatever direction we take as the consequence of our analysis of military requirements and what technology can bring to bear, we must ensure that we do not lock ourselves into narrow technologies and capabilities. Airmen banging on about the flexibility of air power can quickly induce a glazed look in most military audiences, but I

suggest that in an increasingly uncertain world, flexibility will have an even wider utility and importance, embracing all mediums of warfare.

A separate and most important aspect of the technological revolution concerns the instantaneous nature of modern global communications which can provide our political leaders and the public with information at the same time, or even before, it is available to military commanders. As a great admirer of the Iron Duke I can scarce forbear to compare the contemporary world with the Duke of Wellington's time when campaign and battlefield information could be passed no faster then a horse could gallop.

A letter travelled overland at about 60 miles a day. With an intervening stretch of sea the time varied according to the vagaries of wind and tide. Thus Wellington's despatch on the outcome of Waterloo travelled the 220 miles to Whitehall at an average speed of 3½ miles an hour. You will not miss the obvious corollary that strategic direction travelling in the opposite direction was similarly constrained which if nothing else limited Whitehall's capacity for back-seat driving. Compare that happy situation to today and I would like to draw out two points.

First, modern communications increase rather than diminish the political thirst for information and present politicians with the opportunity to become involved much more quickly than hitherto in matters of military judgement. In a complicated world today's communications provide the wherewithal for the very tightest of political control as politicians struggle to rescue an element of choice from the pressure of circumstances. Moreover, their thirst for information is understandably aggravated by the media who can be similarly quick in providing the public with snapshots of a campaign. I stress snapshots because the TV lens rarely if ever can capture the entirety of a military situation.

My second point is that commanders in the safety of a bunker are no longer blind to the activities at the fighting level. Down-linking, green writing and formatted displays, drawn from a variety of intelligence and battlefield information systems, give commanders at the strategic/operational level access to real-time intelligence of what is happening at the sharp end.

But you will not miss the point that the same information can also be made available simultaneously to politicians. This is a fact of life and it will not go away. So we within the military have just got to get used to the idea of the closest political control of our activities, particularly in the context of

operations in the grey area of the spectrum of conflict, which may well be complicated by the need to work in concert with allies who, while sharing a common purpose, may have differing national interests. It follows therefore that military commanders, certainly at the operational level, require some political nous if they are to enjoy the confidence and trust of their political as well as their military superiors.

All this was brought home to me with stark clarity during the Gulf War when I served for nearly 9 months as the Director of Operations in the UK's Joint Headquarters at the operational level. And perhaps I could now interject some personal observations on the pressure for change and the constraints that will now be routinely placed on the conduct of operations short of general war.

As I have already intimated political interest was pervasive and intense throughout the Gulf operation. Given the size of our national contribution – some 45,000 servicemen and women – this was not altogether surprising, and the political spotlight was for the most part, or at least until the war started, focused primarily on resource implications, particularly manpower.

This in turn exacerbated the high national political profile which endorsed some decision making with a political significance far beyond its military worth. This involved us in the Joint Headquarters in an absolutely unending stream of Ministerial submissions proposing the deployment of various units and in my view at the time constrained our efforts to prepare for war and caused a great deal of frustration and extra work.

Well, I was wet behind the ears and certainly naive. Nothing within my previous military experience had prepared me for such an intensity of political interest. Moreover, I was slow to understand that working within such a disparate coalition of nations within the political cauldron of the Middle East, and with the media present in such large numbers, required the exercising of very close political control, and modern global communications permitted it to be so.

Now I am in no way suggesting that military commanders should contemplate abrogating their responsibilities, but if politicians are uncertain about the direction of the path that we in the military recommend should be taken, it is certainly their right to assess every step of the way. And, as we face the uncertainties of the future in an increasingly complex world this will increasingly dominate military decision making.

Now the very same information highway which provides the wherewithal for tight political control, is also available to the media and it

is thus immensely important that we military folk understand the need to factor media coverage and our relationship with reporters into our operational planning. The controlled environment of the Falklands or the Gulf are already history and we certainly can never again count on the probability of exercising formal control over the media.

We need to get used to the idea that the media will probably be at the scene of a crisis before troops deploy and that it will be their reports which largely focus the political mind. It is the picture on the TV screen which will shape public perception of crisis and conflict, and given the need of TV news to simplify issues to a point of presentation in visually attractive segments of only a few minutes, there will be increasing public expectations of quick, simplistic solutions to even the most complex crisis situation. And if we in the military are unable or unwilling to provide the media with the information they seek, they will find it elsewhere.

Warring factions, Non-Governmental Organisations and other possible players such as the UN, UNHCR and Red Cross will fill any information vacuum and their objectives in doing so may differ from those of the military. The larger danger, to my mind, is that 24 hour TV coverage of operations will exert pressures that compress the time available for staff work and military decision making. This, it could be argued, will encourage political and military leaders at the strategic level to bypass formal staff channels and the operational level of command, direct to the tactical level, ie the war fighters themselves.

The consequence of such intervention is similar to that portrayed by the TV lens that I mentioned earlier – no more than a snapshot will be immediately available, which can dangerously distort the perspective of the complete picture, leading to flawed strategic direction. Moreover the commander at the operational level, with his authority undercut, will still be left carrying the can of responsibility. So what to do?

I think it imperative that commanders understand the needs of the media. If they don't themselves, they need trusted and sound advice on the dynamics of the news cycle and on the random but intuitive way journalists make news and deployment judgements which then appear very systemised when they are seen in neat packages on the screen or in newspapers. Commanders must therefore accept the presence of the media and establish an effective interface through the creation of a Public Information Campaign strategy.

A highly experienced and most reputable journalist told me that the

Headquarters of the Allied Command Europe Rapid Reaction Corps – the ARRC – when it was deployed in Bosnia indeed achieved this through a flexible, pro-active and real time response to what the media needed. It was a success story and the journalist believed very strongly that the ARRC's experience in Bosnia should be a case study for new thinking and further examination: I am sure this will be done.

Meanwhile the military maxim must be to release as much accurate information as possible, as quickly as possible, subject only to operational security and the safety of the lives of those involved in operations. Easily said, perhaps not so easily achieved – and may I just add that in the broader context, the whole subject of information warfare, which is beyond the scope of this lecture, is immensely complex, increasingly important and pervasive right across the operational spectrum.

Let me now move to the final element of my talk which links the media image of warfare to the public perception of conflict. There is no doubt in my mind that changes in society affect the way a war is fought. To return to the Duke of Wellington who, as Colonel Arthur Wellesley fighting in Flanders in 1793, found the pivot man of his grenadier company, one Tomas Atkins, with a sabre cut across his head, a bayonet through the chest and a piece of grapeshot in his lungs. He was obviously dying. Wellesley said he was sorry to see him in such a state. 'Never mind, Sir' said Atkins, 'All in a day's work'.

Today, few young men and women from any western country could demonstrate such tough acceptance of the bad cards dealt by fate. They certainly expect more from life but from my personal observation I do not think that young people in military units, be they soldier, sailor or airman, are as sensitive to casualties as politicians sometimes fear. It is western society, fed with instantaneous TV images of violence, death and danger from theatres of operations that is truly sensitive to the impact of casualties.

In the British context I think that our experience in the Falklands and Gulf Wars may have encouraged misleading expectations because victories were achieved with a minimum loss of life and blood. This is not an accurate reflection of the real nature of modern wars which are still remarkably bloody. Look at the casualties, for example, in Afghanistan, Beirut, Chechnya, and Angola. They are in the same field as those of past wars.

However, while we may think that society's tolerance of casualties may be in direct proportion to the value it places on the objective of conflict, I

rather suspect that the practise of war will be limited by society's tolerance of it. In my view and as a general precept, this tolerance in the west has diminished, is diminishing, and will continue to diminish. The trouble is that this intolerance of war, as already inferred, is not universal. There are still many parts of the world where life is cheap under totalitarian Governments who exercise remorseless control of both their media and their peoples.

One can thus envisage conflicts which are not merely asymmetrical in terms of weapons used, but are also asymmetrical as far as the societies that fight them are concerned. Vietnam of 30 years or so ago, perhaps first illustrated the point. Thus casualties suffered in the pursuit of obscure political purposes, and especially if those purposes lie beyond the realm of the relatively quick fix, will appear to many western societies as nothing short of criminal. This sensitivity of society to body bags and its associated low tolerance of casualties is I believe becoming a new determinant factor in the development of strategic philosophy.

May I conclude with a final word about the principles of war, which to me as a British officer remain the most fundamental form of military doctrine. We have ten principles full of red meat such as offensive action, concentration of force and surprise, but it is quite clear that these and the seven other principles require continual examination in the light of new technological developments, with the relative importance of the individual principles of war varying with scientific progress.

This is all well and good when one is operating at the right end of the spectrum of conflict, but when one enters the grey world of peace keeping, let alone peace enforcement operations, I am left wondering as to whether or not the enduring principles of war should be viewed as no more than guiding tenets which need considerable adaptation to meet the political and humanitarian imperatives under which such operations are conducted.

Should the concepts of proportionality and avoidance of collateral damage, for example, now be introduced as separate but entirely apposite principles in the context of peace support and peace enforcement operations? It is certainly an area that requires careful thought and consideration – and merits a lecture in itself and which I am not yet prepared to give.

In summing up, I think you will agree that pressures for change on the conduct of warfare are probably stronger now than at any other time in history. There have been breathtaking advances in technology which affect

the military both directly and indirectly. New technology arrives with ever greater frequency, thus making decisions over choice and affordability ever more painful and difficult.

While warfare at the right hand extreme of the spectrum of conflict is unlikely, at least in the short term, we need to come to terms with the probability of a continuing commitment to low intensity operations under tightly controlled Rules of Engagement. Political considerations will play a pervasive role in the development of operational plans and we in the military will be required to provide accurate and timely information to the highest level of Government.

The principle of minimum necessary force will dominate much of the decision making process and thus targeting will need to be not only appropriate but also precise with a high degree of assurance that collateral damage will be minimised. While significant casualties are likely to be politically and publicly unacceptable, our forces deployed on operations may have to face highly sophisticated threats, some of western origins – the Stinger man-portable Surface to Air Missile comes immediately to my airman's mind as an appropriate example.

Overall, the very demanding nature of military tasks within the centre band of the spectrum of conflict, conducted within a framework of tightly drawn political constraints, will drive the need for highly capable equipment that fully exploits available technology, and this brings me to the key message that I want to leave with you.

Low technology solutions to the challenge of operations other than general war, will both increase the risk to our forces and reduce their effectiveness. This simple fact needs to be very clearly understood by our political masters and those who hold the budgetary purse strings. For our part we in the military must embrace the political and military realities of the operating environment as we approach the next millennium and ensure that our doctrine is coherent and relevant to a complex and uncertain world.

Someone once said there is nothing so painful to the military as the experience of a new idea. In contemporary idiom 'no pain, no gain' and we soldiers, sailors and airmen must get used to the idea of change in the post Cold War era. And if we don't understand the pressures for change and their likely consequences on the conduct of warfare, we in the military are quite simply failing in our professional duty; not only to our Governments but also to those whom we command.

DISCUSSION PERIOD

Sir Freddie Sowrey asked CAS whether he envisaged that the media might in future be able to move about on both sides of the battle line with relatively impunity. Sir Freddie suggested that the beginnings of such a trend might possibly have been discerned during the Vietnam War and, even more so, during the Gulf Campaign. Traditionally, the press had an essentially partisan outlook; might they not become more neutral in the future and eventually come to be regarded in the same light as, say, the Red Cross?

Initially observing that this question opened up the very complex field of information warfare, CAS doubted that the press would ever be entirely neutral. He made the point that the function of a reporter was to write a story and get it back to his editor, the underlying aim being to sell more newspapers or to capture more viewers for a TV station. To do this, the press had to have a point of view and this was bound to compromise their neutrality. As to mobility, this was feasible in low-level conflicts, as in Bosnia when reporters had been able to travel with relative freedom and thus provide coverage of incidents from the viewpoint of both Serbia and IFOR. When the intensity of operations increased, however, this was not really practical. A reporter who happened to be in Baghdad when the Gulf War began was stuck there. For a news team to have attempted to cross over to Iraq from Saudia Arabia would have been hazardous in the extreme and those already in Iraq who attempted to move about were subjected to harassment and even imprisonment. In the general context of the relationship between the press and the military Sir Richard went on to touch briefly on the option of 'planting' stories as a form of information warfare. Such a ploy could be attempted covertly or with the complicity of the media, effectively bringing the press 'on side' to play an active role in a campaign. CAS acknowledged that the idea had certainly been aired but, in his view, it had little appeal to the British forces. In closing, Sir Richard reminded the Meeting that it was important to remember that 'news' happened where a journalist happened to be – which was not necessarily where important events were occurring.

Referring to CAS' observations on the need to embrace new technologies, **Jeff Jefford** wondered how a fighter pilot, like Sir Richard, really felt about the concept of Remotely Piloted Vehicles (RPV).

CAS said that he had no problem with it – especially as it would not

happen in his time! Looking to the long-term, there would be a need to replace the Tornado GR4 with a new deep strike aircraft, perhaps from 2015. Would it be manned? Sir Richard could not honestly say, but he reminded his audience that RPVs were already with us and that the Army currently used such a system for reconnaissance. CAS suspected that the RAF might eventually use such vehicles for some of its less attractive tasks, perhaps long-term long-range surveillance operations, but he was confident that the RAF would be employing aircrew to carry out specific roles and missions for at least another fifty years.

Reverting to the general theme of the media, **Sir Michael Beetham** foresaw that there could be circumstances when it might be necessary to impose a news blackout. He asked CAS whether Ministers were aware of this and whether it would actually be possible in view of today's technology.

Sir Richard agreed that the occasional news blackout might indeed be highly desirable but he doubted that it was feasible. With the means at his disposal today, if a reporter really wanted to get a story out, he would do it. As a very commonplace example, CAS pointed out that during a recent visit to Kuwait he had observed that many of the airmen serving there had mobile telephones, permitting them to be in personal daily contact with their families. In view of the numbers of such devices, it would be virtually impossible to impose a total communications blackout. Referring to Sir Michael's specific point about Ministers, CAS said that they were well aware of the potential of communications and that, while it might not be possible for them to stop information flowing, they might well be able to exert some influence by controlling its release. There were considerable dangers here, however, and CAS recalled that during the Gulf War it had sometimes been difficult to constrain Ministers from saying too much. There had also been problems persuading them that it was not actually essential for them to have direct links between their offices and the brigadiers commanding Battle Groups in the field!

Pursuing the question of mobile telephones **AVM Baldwin** wondered how, in wartime, one could prevent security from being compromised when, say, a Tornado pilot was capable of checking in with his family after returning to base and perhaps inadvertently saying too much? He asked whether people were actually allowed to have such devices under operational conditions.

CAS said that they were and did. Furthermore, since mobile telephones

are a fact of daily life in the 1990s, he considered that it would be impractical even to attempt to deprive people of them. The best that could be done would be to impose a moratorium on their use when this became absolutely necessary. At this point, Sir Richard said, one simply had to rely on good order and discipline. During the Gulf War people had clearly been sensitive to, and had understood the need for, communications security; in CAS' experience, the sense of discipline was still there and everyone had responded well.

Given that the present century had had the worst record for warfare in the history of the world, and that each advance in technology produced disadvantages, as well as benefits, **Humphrey Wynn** asked CAS for his prognosis as to whether, in military terms, the 21st Century would be better or worse than the 20th.

CAS regretted that his answer had to be 'worse'. Drawing attention to the recent display of nuclear brinkmanship between India and Pakistan and the crudity of the weapons involved, he shuddered to think of what might occur when their potential was added to the chemical and biological devices and the associated delivery systems (of ever-increasing range capability) that were being developed by other less responsible states. It was a very depressing scene. Sir Richard reminded the Meeting that the permafrost of the Cold War had imposed its own discipline. Now that it had thawed, that discipline, which had confined a nuclear capability to the Super Powers, supported by the UK and France, was simply no longer there. Since that codified structure no longer existed – certainly not between India and Pakistan – CAS considered that the situation was bound to deteriorate further as more countries in the Middle East and the Orient gained access to such weapons. CAS thought it a 'pretty gloomy' outlook and stressed the enormous responsibility which now rested upon the West, primarily the USA, to exercise its power. He considered that it would be appropriate for the UK to add its influence where it could and that ethics and morality might have to play a more prominent role in foreign policy than even before – all of which provided a powerful rationale for the maintenance of well-equipped and very professional armed forces.

Finally, **Alex Higson** returned to the topic of relationships with the press. As a rider to CAS' response to Sir Michael Beetham's earlier question, he first noted that the transmitters available to TV journalists in the field during the Gulf War had weighed about a ton and took four hours to assemble; today's equivalent could be carried in two suitcases. His own

question was sparked by CAS' observations on the need to bring the media 'on side'. Wg Cdr Higson thought this a 'revolutionary' concept and he wondered how the word might be spread. Might it be from the top down, perhaps via RCDS and Staff College, or from the bottom up, by educating young officers at Cranwell at the beginning of their careers? He considered that, especially in an operational context, the idea might well seem quite alarming to a lot of people in the military. CAS observed that the press was not really interested in the military unless there was an activity which was considered newsworthy. As an instance, Sir Richard cited the recent sudden deployment of Jaguars to cover the Kosovo crisis. This had attracted immediate attention and had been well reported but no one had bothered to visit Coltishall since. Nor had anyone shown much interest in what the detachment was doing at Gioia del Colle. CAS also noted the unfortunate tendency for the press to focus instinctively on bad news, so that a particularly unsavoury court martial attracted reporters in flocks. There is, CAS concluded, 'an asymmetry'. What he would like to see is consistent interest in the RAF (and the other Services) portraying it as a highly professional organisation, full of committed people who are proud of what they do. He recognised that it was not possible to attract the media to this sort of thinking process – because it is not newsworthy – yet, whenever the RAF was committed to operations, it could not keep them away. Amplifying what he had said during this address, CAS suggested that as early as the planning stage, much sooner than in the past, informal briefings should be given to responsible journalists to tell them as much as possible, while stressing the really sensitive areas of operational planning – those over which they should exercise discretion. Using this sort of approach, Sir Richard noted that in his own experience, most recently in connection with the Strategic Defence Review, he had been let down only once. He was hopeful that this sort of responsible behaviour could be extended into an operational context.

LOGISTICS SEMINAR

WELCOMING ADDRESS BY SOCIETY CHAIRMAN

Air Vice-Marshal Nigel Baldwin

It is great pleasure for me, on behalf of the Historical Society to, firstly, thank Air Marshal Colin Terry and his staff for both supporting the concept of today's seminar and for putting so much effort into making it work. It is always good, especially when you are retired, to come back into the ambience of a proper RAF station, and it is especially valuable for members of our Society to meet and mix with the present day Air Force.

It is a pleasure, too, for us to have Sir Michael Alcock in the chair – he and I have worked together before, not least during the Gulf War where we were both incarcerated underground at High Wycombe for weeks on end. I suppose he taught me all I know about Logistic Multi Disciplinary Groups – usually in the small hours of the morning. I was certainly a sounding board for many of his ideas. During my time at HQ Strike Command, Sir Michael oversaw the marriage between the Engineers and the Suppliers. We pilots and navigators on the Plans and Air Staff, I suppose, were the groomsmen at the wedding and looked on with amazement – but it seemed to work out well.

I think it was Field Marshal Montgomery who, when he became CIGS after WWII, added 'Administration' to the list of Principles of War. By 'Administration' he meant what we now call 'Logistics'. He was in no doubt of their importance. Today we have the chance to study the subject across the life of the Royal Air Force. It is just the sort of thing we should be doing as a Society, and I commend and thank most strongly Gp Capt Peter Dye and Sqn Ldr Stuart Ainsworth for their efforts in enthusing us to mount the day.

Sir Michael, over to you.

INTRODUCTION BY SEMINAR CHAIRMAN

Air Chief Marshal Sir Michael Alcock

Its seems appropriate that this Seminar on Logistics Support has coincided with The Strategic Defence Review. Logistics issues will, I am sure, feature heavily in the Review and, who knows, our analysis today may well serve to inform what goes on in the MOD – though that was not in my mind when Peter Dye wrote before the Election asking me to take part today!

Also it seems appropriate that the proceedings are taking place at HQ Logistics Command, an organisation whose sole aim is in support of Air Operations, neatly encapsulated by its Motto *Sustentamus ut Bellent* – loosely translated as 'we support that they may fight'.

Our agenda sets out to chart the many changes that have taken place in Support of Air Operations from the First World War up to date. Hopefully this will stimulate interest and thought on this vital component of any operation, for without Logistics Support there is no operation.

THE ROYAL FLYING CORPS LOGISTIC ORGANISATION

Group Captain Peter Dye

It is perhaps difficult, at this distance, to appreciate just how novel the aeroplane was when the Royal Flying Corps (RFC) was formed on 13 May 1912. And yet, within a little over six years, it would form the basis for the world's first independent air force; and reputedly the world's largest with some 2,300 aircraft and 300,000 personnel. Many of those attributes now associated with air power were first demonstrated by the RFC, even before the war started, in a series of pioneering exercises and trials conducted by a small group of enthusiastic and visionary officers and NCOs, some of whom would go on to achieve high rank in the Royal Air Force (RAF). In this presentation, I shall be concentrating on the logistic organisation developed by the RFC and, in particular, the support of deployed operations in France between 1914 and 1918.

From its inception, the RFC was intended to be employed in direct support of the Navy and the Army. Not only was the organisation of the Military Wing of the RFC tailored for deployed operations alongside the Expeditionary Force, but the flight and squadron system was specifically chosen to provide for flexibility and ease of handling in the field. Each squadron – comprising three flights of four aeroplanes and an HQ flight – was to be a homogeneous unit, with its own field repair, stores and transport services, and self-supporting as regards cooking, supplies and so on. The individual flights were also self-contained and could be detached for short periods. This organisation survived the test of two world wars and is still recognisable today.[1]

The early aeroplanes were delicate, fragile and unreliable. Their integrity deteriorated rapidly when exposed to the elements such that hangarage was essential to provide protection for both machines and mechanics. The technologies involved were extremely high for the time, demanding skills and equipment that were not readily available. Engine lives were short, requiring thorough overhaul after a comparatively brief period. Effective support was made all the more difficult by the proliferation of aircraft and engine types and the lack of standard components. To enable the squadrons to function effectively in the field the logistic organisation had to be mobile and self-contained, although it was also recognised that even with these arrangements, only a proportion of aircraft would be available for operations.[2]

The key was motor transport – itself a fledgling technology. By the time of the Military Wing's famous Concentration Camp at Netheravon in June 1914, each squadron had a wartime establishment of 26 lorries and tenders, together with six motorcycles and trailers.[3] The need for these vehicles had been clearly demonstrated in successive exercises; but in peacetime affordability was the main issue.[4] A novel scheme was therefore introduced, at the behest of the Treasury, under which up to half of the lorries were provided by subsidy. This operated on the basis of a grant (£50 towards purchase and £20 per annum for maintenance to agreed standards) paid to participating firms with the understanding that in an emergency the Army would purchase the vehicles for full-time use. When war was declared, there were over 1,000 vehicles registered under the scheme, many of which were destined for the RFC and subsequently appeared in France still sporting their commercial colours; including No 5 Sqn's infamous brilliant scarlet lorry, previously operated by Maple's store, advertising *'HP' Sauce – The World's Appetiser.* Not surprisingly, such incongruous sights fostered the belief that the RFC was woefully prepared for war. In fact, it was evidence of an innovative and pragmatic solution to that perennial problem – matching resources to needs.[5]

Even before the war, it was recognised that squadrons could not support themselves for more than a limited period in the field and that a facility was required – close to the army's operations – capable of undertaking a greater depth of repair and holding a wide range of spares and equipment. These needs were met by a Line of Communications Workshop which became known as the Flying Depot, and later the Aircraft Park, based at Farnborough and comprising separate stores and workshop sections capable of packing up and moving in 24 hours. On the outbreak of war, the Aircraft Park – comprising 12 officers, 162 other ranks, 4 motorcycles and 4 aeroplanes in crates – deployed to France to support the squadrons in the field, arriving at Boulogne on 18 August 1914.[6] The Official History records that, on disembarkation, the port landing officer sent a urgent wire to General Headquarters: *An unnumbered unit without aeroplanes which calls itself an Aircraft Park has arrived. What are we to do with it?* Despite this initial hiccup, the Aircraft Park proved itself invaluable in sustaining the four deployed RFC squadrons. It was, in effect, their travelling base and as such was constantly on the move. Eventually, at the end of October, after five changes in location, the Aircraft Park found itself at St Omer where it would remain for much of the war.[7]

By the end of 1914, the system for the supply of materiel to the squadrons in the field had developed. Two aspects are worthy of note. First, a considerable quantity of materiel was purchased directly in France and delivered to the Air Park for formal acceptance and issue. This included aircraft as well as engines, wireless equipment and a wide range of aeronautical stores. Such was the urgency of the RFC's needs that, in the first 6 months of the war, 100 complete aircraft were purchased from French manufacturers (mainly Blériot, Maurice Farman and Morane), part of a total of 1,500 airframes of various types purchased in France during the course of the war. The employment of these aircraft and associated equipment, whilst of significant operational benefit, considerably complicated the Aircraft Park's logistic efforts, particularly the interchangeability (or lack of it) between British and French-sourced components.[8]

The second point I would make, is that all other stores for the Air Park were issued by the Ordnance Aeronautical Stores Department (OASD), part of the Army Ordnance Department, based at Farnborough. Their supplies were obtained either by direct purchase or from the Royal Aircraft Factory.[9] The increasing range and quantities of material that had to be handled led to the setting up of a dedicated stores depot in October 1914 to hold aircraft, engines, pyrotechnics and all stores special to the RFC. Almost immediately, the buildings at Farnborough proved inadequate to the task and additional stores were established at Greenwich and Didcot; the first elements in a stores distribution system that would ultimately comprise 7 main depots and 10 distributing parks in the UK alone. I should add that the situation at Farnborough was not made any easier by the requirement that all aircraft purchased for the RFC had to be flown there, or delivered crated and then erected, for inspection and flight testing by the Aeronautical Inspection Department (AID). This potential bottleneck remained until March 1915 when regional delivery centres were opened.[10]

As the war grew in scale and intensity, ever greater human and materiel resources were needed to sustain the RFC in the field. The growth in the number of front line squadrons, the increasing complexity of aircraft and their supporting equipment and the rapid rise in wastage through accidents or combat losses, placed the existing logistic organisation under considerable strain. The Aircraft Park itself came to resemble, in the words of its commander, *a gigantic factory and emporium,* repairing everything from aircraft to wireless equipment and vehicles. The range and quantity of

spares to be handled created immense difficulties. The stores section alone was responsible for requisitions ranging from complete aircraft to horserakes and lawnmowers for keeping aerodromes trim. As a result, by July 1915, the Aircraft Park had become just too unwieldy to satisfy the demands placed upon it and thus a second park was established at Candas to cater for those squadrons working directly for the newly formed Third Army.[11] Both parks were supplied by rail from separate RFC port depots, based respectively at Boulogne and Rouen, which received all the RFC's stores from England. In due course, the Rouen base become a huge engineering complex that included the RFC's Engine Repair Shops at Pont de l'Arche which, by the summer of 1917, would comprise over 1,700 personnel employed in the overhaul and repair of engines from every squadron on the Western Front.[12] Repairs were also carried out by civilian contractors, but the bulk of arisings were placed in Service repair shops in order to avoid persistent labour and production problems in the UK.[13]

Even with these changes, it was evident that unless the parks were relieved of some of their heavy repair work and the vast range of stores that they were now required to hold, there was no possibility they could sustain a mobile role. The elegant solution was to create new air parks for each RFC brigade and to convert the original air parks into fixed supply and repair depots. Accordingly, three new air parks came into being on 15 December 1915 to support the 1st, 2nd and 3rd Brigades respectively. Each air park was kept as small as possible, comprising some 150 personnel organised into separate repair, stores and transport sections, and was based in the rear of the army area, adjacent to a railhead to enable a rapid move if required. In turn, the original aircraft park at St Omer became No 1 Aircraft Depot and that at Candas No 2 Aircraft Depot.[14] Each depot comprised some 500 to 1,000 personnel, depending upon the number of squadrons to be supported, organised into a wide range of repair and stores sections. Consumables, such as ordnance, petrol, rations, clothing and so on, were provided by a combination of Army supply, specific RFC arrangements and local purchase. In the case of aviation spirit, this was provided in 2 and 4-gallon cans direct from England, using the Army supply system, although the quantities – 600,000 gallons per month – were such that by early 1918 filling arrangements were provided in France.[15]

By June 1916, and the Battle of the Somme, the RFC's logistic organisation had expanded to support over 400 aircraft in the field. The bulk of the operational squadrons were based 6-8 miles from the front line.

The air parks, responsible for day to day support of the squadrons and holding one month's supply of aeronautical stores, were located at railheads some 5-10 miles further back. The park's stock holdings were strictly controlled to ensure that mobility was not impaired and all stores were packed in specially constructed cases that could be readily loaded onto lorries and issued, if necessary, 'on the move'. Minor facilities, for example to conduct wing repairs, were provided but they were first and foremost issuing centres. The parks were supplied in turn by the two main depots, up to 40 miles from the front line, each with three months' stock of aeronautical and transport stores. The depots also received, and issued direct to the individual squadrons, new aircraft, maintained an attrition reserve and overhauled and rebuilt aircraft, balloons, transport and associated equipment. All aircraft and engines requiring repair outside squadron capabilities (assessed as in excess of 36 hours) were returned direct to the depots, as were all wrecked aircraft.[16] In theory, because of their size and extensive facilities, the depots were static. But, when the Germans threatened to break through to the Channel ports in 1918, both depots were moved as a precaution – not without difficulty – some 20-30 miles to the west, where they remained until the war was over.

The importance of salvage and repair cannot be exaggerated. Wastage rates at the beginning of the war were relatively low, about 10% per month, however by June 1916 it had reached 47.7% per month, rising to a staggering 64.6% during the course of the Battle of the Somme. In July 1917, it was calculated that to keep 1,800 aircraft in the field (approximately the size of the RAF in France at the Armistice) 1,500 aircraft would have to be provided each month.[17] Every aircraft that could be repaired or rebuilt and every component or engine that could be salvaged helped to offset these massive losses and sustain the RFC's operations. Thus, during September 1917, at the height of the Third Battle of Ypres, the two main depots working night and day issued 930 aircraft, reconstructed 116 and erected 113.[18]

In parallel with these developments, it had become abundantly clear that specialist officers were required to oversee the RFC's technical needs, both to supervise stores and to manage the repair and overhaul of aircraft and equipment. In fact, to find Flying Officers for such duties, when the lack of trained pilots was a severe constraint on the RFC's expansion plans was simply not possible. As a result, Equipment Officers had been introduced from early 1915 and by July were to be found in all wings and squadrons in

France.[19] Their duties embraced what would now be called the engineer and supply disciplines. The arrival of Equipment Officers took much of the technical burden off the Squadron Commander's shoulders giving him more time to concentrate on operational matters. In fact, on some squadrons, such as those employed in Corps duties (army co-operation), there were eventually up to four Equipment Officers on the establishment.[20] Their overall importance is indicated by the fact that, in a little over a year (that is by July 1916), nearly 400 of the 2,000 officers in the RFC were graded as Equipment Officers – about 20% of the total strength.

I have already alluded to the shortfalls in the delivery of equipment, made good by direct purchases in France. In the course of the war, over 55,000 airframes and 41,000 aero-engines were produced by British industry, primarily for use by the RFC and RNAS. This achievement is all the more impressive when one recalls that, at the outbreak of war, there was practically no aero-engine industry and a total of only eight aircraft contractors. This massive expansion in production inevitably created problems, ranging from dilution of skilled labour to shortages of critical components. Even so, by July 1916 deliveries to the RFC had reached 120 aircraft per month, rising to an average of 1,229 per month in 1917 and 2,668 in 1918. Completed aircraft were sent directly from the manufacturer to a system of Aircraft Acceptance Parks, developed from the regional acceptance centres described earlier, but controlled by the RFC from March 1917 onwards. Ultimately there would be 16 acceptance parks, but it should be emphasised that their existence was largely owed to continuing failures in supply, not only of engines but also of components such as crankshafts, magnetos and ball bearings. Although the government took upon itself responsibility for the production and allocation of these critical items, it was found much easier to increase the rate of manufacture of airframes, using a wide range of companies – many of which had not produced aircraft before. Thus, there was a rapid build-up in stocks of airframes pending availability of what would now be termed government furnished equipment. The acceptance parks were therefore established to enable airframes to be accepted formally from the manufacturers, pending completion, so avoiding the possibility of congested factories and production bottlenecks.[21]

In the event, this system worked remarkably well, although it would clearly have been preferable and more efficient to deliver aircraft and equipment direct to the depots. When an airframe was completed by the

manufacturer it was inspected by the AID and, once passed, delivered (generally by road) to the appropriate park for completion and onward despatch to the depot. Thus, Armstrong Whitworth FK8 – Ser No B 273 – was passed by the AID, less engine, at Newcastle on 21 June 1917 and dispatched to No 8 Aircraft Acceptance Park at Lympne on 25 June. The aircraft was successfully flight tested on 12 July, after installation of its 160 hp Beardmore engine, and delivered to No 1 Aircraft Depot at St Omer on the same day for wireless equipment, guns and other accessories to be fitted. The completed airframe was then transferred to No 2 Aircraft Depot at Candas on 31 July, where it remained in store until issued, as received, to 'A' Flt, No 2 Squadron on 1 September – some 9 weeks after it had left the manufacturer (incidentally, this particular aircraft served on No 2 Squadron until 18 January 1918, when it was shot down by enemy aircraft and destroyed by fire, having completed a total of 157 hrs 55 min in the air since purchase).

The main elements of the logistic system were in place by this stage of the war. The Army Air Parks and flying squadrons comprised the mobile element, while the depots (in theory) were static. It will be noted that the OASD is no longer shown, having been absorbed by the RFC in January 1917 when the latter took responsibility for the supply and storage of all aeronautical materiel. On the ground, the network of parks and squadrons had grown, to support over 800 aircraft – double the RFC's front line strength in 1916.

The division of work between the various elements of this system was designed to ensure that the flying squadrons could meet their operational task, yet not be encumbered with excessive equipment and personnel that would limit their mobility. Given the common perception that warfare on the Western Front was a rather static affair, this might seem an unnecessary concern, but in fact the RFC's squadrons moved surprisingly regularly – very much as the operational situations dictated. Thus, No 9 Squadron, employed on Corps (army co-operation) duties from December 1915 until the Armistice, was based at 20 different airfields in France and Belgium, roughly a move every two months. Some of these deployments were major relocations to a different army area, up to 70 miles away, while others were successive moves to keep in touch with the changing front, as in the last few months of the war. In all cases, the squadron was able to conduct operational sorties within 48 hrs of leaving its previous location – an impressive achievement.

It is perhaps appropriate at this stage to look at the individual squadron logistic organisation in a little more detail. The RFC squadrons in France nominally retained the pre-war establishment of 12 aircraft, but this was usually augmented during active operations; in the case of the Corps squadrons up to a total strength of 21 or even 24 machines. Each flight had its own flight sergeant responsible for some 35 or so mechanics, allocated in small groups to specific aircraft. The flight fitters carried out daily servicing and minor adjustments (such as valve grinding) on their own aircraft while the HQ flight undertook deeper maintenance and rectification (effectively, the equivalent of second line). Together with the inevitable specialist sections (wireless, photographic, armament, stores and so on) and support staff, each squadron needed some 190 ground personnel and 45 vehicles to keep it in the field.[22] The latter included provision not only for the transportation of tents and hangarage but also for a wide range of mobile facilities, including machine shops, wireless vans, generators, darkrooms and so on. Moving this number of personnel and their specialist equipment safely across the poor roads of the Western Front was a major challenge. That the RFC was able to do so consistently, notwithstanding the lack of prepared airfields and the limited availability of suitable accommodation and other infrastructure, is evidence of the high degree of mobility that was actually achieved.

The flexibility of the overall system was such that it was able to take on additional responsibilities, including the supply of air ammunition from 1917 onwards, as well as greatly expanded salvage, stores and transportation capabilities as the war progressed. This was achieved by the simple expedient of adding individual specialist sections subordinate to the air parks and depots. Thus, in October 1917, when the volume of new aircraft deliveries (then averaging 400 a month) and the quantity of repair and salvage work were beyond the capabilities of the depots, the existing repair sections were separated from their parent depots and expanded into Aeroplane Supply Depots (ASD) responsible solely for aircraft receipt, issues and repairs. This left the depots to concentrate purely on the receipt, and issue of aeronautical spares and the reception, repair and issue of MT.[23] At the same time, it was also decided to create a strategic transport reserve by withdrawing a proportion of each squadron's vehicles to form a Reserve Lorry Park attached to each brigade – arrangements that more than proved their worth during the RFC's desperate but largely successful redeployment in the face of the German March 1918 offensive.[24] These developments

marked the last significant changes to the logistic system before it was inherited by the RAF on 1 April 1918.

By August 1918, and the final Allied offensives, the RAF's logistic arrangements were different. The notable changes compared to 1917 are the introduction of the Aeroplane Supply Depots and Reserve Lorry Parks, but equally importantly the organisation had expanded to support almost twice as many aircraft. In the last few months of the war, as the front advanced rapidly, it became necessary to move forward the Issues Sections of the Air Parks to keep in touch with the squadrons. Similarly, advanced sections of the main depots were deployed to railheads close to the advancing armies in order to maintain supplies to the rapidly moving Air Parks. These changes were successful, reflecting once again the basic strength and flexibility of the logistic system established by the RFC.

To conclude, between 1912 and 1918 the RFC developed a highly sophisticated and extensive logistic system, managed by professional technical and stores officers, that was able to provide effective support for deployed mobile operations, including extended periods of intensive fighting, while coping with an immense increase in numbers and technical complexity. The RFC was very much the pioneer in this field, providing an example for other air arms including those of France and the United States. Indeed, the Air Service of the American Expeditionary Force (AEF) chose to adopt the RFC's logistic system in its entirety, including terminology, when setting up their own supply and technical support arrangements for the Western Front in 1917.[25]

The RAF never commissioned a 'logistics lesson learned' study, but had they done so their experience might have been summarised, as follows:

Air power was an expensive weapon. Air expenditure was running at approximately one million pounds a day by the end of the war (at present prices, equivalent to £12 billion a year – or just over half of Britain's defence budget).

Maintaining aircraft away from the home base demanded considerable resources. The 1,800 aircraft deployed on the Western Front at the end of the war required some 50,000 support personnel in France and Belgium, together with 2,000 aircraft in reserve or at the depots, and an extensive network of supply and repair facilities. In short, the RFC discovered that the 'tail to teeth' ratio for combat aircraft was extremely high.

Attrition on active operations was immense. By the end of the war, the average monthly aircraft wastage rates was 52%. In the last 10 months of the war, 7,230 aircraft were delivered to the RFC in France just to make good operational losses. In-theatre repair and salvage, although important (particularly in the case of aero-engines), could never make up for this deficit.[26] Only the home base and its industrial capacity could meet such needs.

Effective support demanded the ready availability of spares. At the Armistice, the Expeditionary Force was operating some 20 aircraft types and 23 different engines. Without a wide range of readily available spares, the flying squadrons could not have continued to operate nor could the depots have been able to issue or repair over 900 aircraft each month as well as 500 aero-engines.[27]

Rail and motor transport were critical to the supply pipeline. Without a rapid and effective system to distribute stores and consumables, the RFC could not have sustained the required levels of mobility and operational tempo. The importance of motor transport was such that, by April 1918, the RAF possessed over 8,500 vehicles and motorcycles compared to just 700 in May 1915.

Preserving mobility was a constant battle. It was rapidly discovered that the natural tendency of deployed units was to regularise support arrangements, establishing ever deeper roots and inevitably growing larger with time. Without constant and regular attention to these aspects, mobility rapidly suffered.

The essential 'lubricant' was manpower. Without the determination, flexibility and professionalism of large numbers of skilled tradesmen, on the squadrons and in the depots and parks, there could have been no logistic system.

These are, of course, my own conclusions, but they are very similar to the principles established by the AEF, who concluded that, to be effective, the Air Service's supply system had to be:

- Adequate in scope with a margin of capacity to meet unplanned arisings.
- Adaptable to new conditions and resourceful in either manufacturing or securing in the open market any of the manifold commodities it

might be called upon to furnish.

- Equipped with extensive material facilities; and manned by adequate numbers of well trained personnel. In this respect, it was stated that, *there should never be an undue fear of placing with the supply and instruction centres a large proportion of the soldiers of the Air Service. An undermanned service of supply is a vital handicap to the Front.*[28]

Eighty years on, these seem to me to remain eminently sound principles for the conduct of logistics support to deployed operations.

It would be misleading to suggest that these lessons were entirely forgotten by the RAF during the inter-war period but, under the pressure of peace and financial stringency, an organisation that had comprised at its peak 24 repair depots at home and overseas, 12 aircraft parks, 16 aircraft acceptance parks, 7 stores depots, 10 stores distributing parks and numerous subsidiary units, was reduced by the 1920s to just six home depots and three overseas.[29] What is more significant, however, is that there was no place in the peacetime organisation for an engineer branch and thus none of the 5,000 Technical Officers serving with the RAF at the end of the war were retained. In the future, their duties would be undertaken by General Duties officers – I leave it to others to comment on the wisdom and long-term impact of this decision.

Notes:

[1] A personal account of the rationale behind this system is provided by Sir Frederick Sykes – *From Many Angles,* pages 94-95.

[2] Major Sefton Brancker, in a lecture reported by *Flight* dated 12 June 1914, commented that the difficulties of maintenance were sometimes lost sight of – the aeroplane and its engine being both delicate and fragile – necessitating the provision of large quantities of spare parts and portable tents for housing machines. As a result, only a small proportion of aeroplanes in the field would be fit to take to the air at any given moment.

[3] Each squadron's war establishment comprised: 1 Crossley touring car for the CO; 6 Crossley light tenders for the conveyance of riggers, men and boxes; 6 heavy tenders for the transport of large spare parts, camp equipment, etc; 3 reserve equipment lorries; 3 shed lorries, 3 flight repair lorries fitted with hand-power tools; electric lighting plant, raw materials, etc; 1 heavy repair lorry fitted with machine tools; 1 lorry carrying spare parts and stores for the mechanical transport; 1 baggage lorry; 1 lorry for POL; 6 motor cycles; and 6 aircraft trailers, By December 1915, the establishment for a Corps squadron had risen to a total of 30 lorries and light tenders with 8 motor cycles & sidecars and 8 aircraft trailers.

[4] An analysis of the Army's 1912 manoeuvres showed that 8 steam wagons, 10 heavy lorries, 12 light tenders and 8 motor cars had been required to keep 2 airships and 14

aeroplanes in commission.

[5] In this respect, the experience of the Air Service of the American Expeditionary Force (AEF) mirrors the RFC's, although an overall shortage of trucks forced the AEF to centralise the management of all motor transport, much to the chagrin of the Air Service who envied the RFC's independence. Roger G Miller – *What to do with the Truck?,* Air Force Journal of Logistics, Winter 1997.

[6] The mobilisation plan had called for 24 aircraft to be crated, but in the event, the balance was either flown direct to France or used to make up deficiencies on the squadrons.

[7] Technically speaking, St Omer was the Aircraft Park's advance base – the base echelon remaining at Rouen.

[8] Maurice Baring – *Flying Corps Headquarters 1914-1918*, pages 145-146, Heinemann, London 1930, describes the problems faced by the operational squadrons arising from the confusion between English and French spares.

[9] The supply of complete machines and vehicles was in the hands of the Director Military Aeronautics at the War Office.

[10] The AID had been formed in December 1913 as an inspecting body for aircraft construction and acceptance. Originally under the overall control of the War Office, it was in effect civilianised in March 1917 when control was passed to the Ministry of Munitions and its remit extended to deal with the supply of all aircraft. The AID had grown into an organisation of some 10,600 personnel by the end of the war. For a history of the AID in the First World War, see *Aeroplane Monthly,* November 1993.

[11] In August 1914, the Air Park was responsible for just 63 aircraft in the field, but, by May 1915 this had risen to 156. More significantly, 2,260 aircraft and 2,953 engines were on order *(Statistics of the Military Effort Of The British Empire* – HMSO, 1922).

[12] The ERS output in August 1916 was roughly 100 engines per month with an establishment of 10 officers and 406 O/Rs. It was agreed to increase this in two stages until, by May 1917, the output reached 400 engines per month with an establishment of 32 officers and 1,702 O/Rs – AIR 1/529/16/12/75. The total output for the last year of the war (10 months) of repaired or rebuilt engines reached 3,196 from an establishment of 4,532 personnel of all ranks – AIR1/686/21/13/2252.

[13] The perceived advantages arising from this policy were: immunity from civilian labour troubles; the training potential to the Service in undertaking the work; and the reduced turnround time because of the proximity of Service workshops to the frontline – *History of the Ministry of Munitions, Vol XII, Part 1, Chap III,* pages 79-81. However, it was also recognition that industry could not keep pace with repair requirements. In June 1918, for example, there was a total outstanding deficiency of 1,491 repaired engines from civilian firms as compared with the scheduled output.

[14] Raleigh & Jones – *War In The Air.* Vol 2, pages 188-190.

[15] By early 1916, the Army's total petrol consumption had risen to over 2,000,000 gallons a month of which at least 200,000 gallons was aviation spirit. By 1918, the RAF required at least 600,000 gallons per month to sustain operations – *Military Operations In France & Belgium 1916*, pages 102-104 refers. Some bulk distribution arrangements were put in hand in 1918 to support the Handley Page bombers of the Independent Force and there were plans to provide each Reserve Lorry Park with dedicated fuel trucks but, for the majority of the war, all aviation fuel for the RFC in France was provided in cans.

[16] Raleigh & Jones, *op cit,* Vol IV, page 358.
[17] *Ibid,* Vol VI, pages 92-93.
[18] *Ibid,* Vol IV, page 202.
[19] Two grades of equipment officers were initially established, Equipment Officer (with the rank of Capt) for wings, and Assistant Equipment Officer (with the rank of 2/Lt) for squadrons.
[20] For example, in 1917, No 9 Squadrons had on its strength one Equipment Officer (Grade 3) Squadron and three Equipment Officers (Grade 3) Wireless.
[21] In August 1918, there were more than 4,200 machines in store without engines – *History of the Ministry of Munitions, Vol XII, Part 1, Chap III, page 79.*
[22] For fighter squadrons, the formal establishment was smaller, comprising 149 groundcrew and 35 vehicles.
[23] The new organisation came into effect on 1 November 1917, comprising No 1 Northern ASD (reception park at Marquise, repair park at St Omer and issue section at Sery) and No 2 Southern ASD (repair park and issue section at Fienvillers). The strength of the former was 92 officers and 2,235 other ranks and the latter, without a reception park, 50 officers and 1,905 other ranks – based on 80 squadrons employed on the Western Front. The strengths of No 1 and No 2 Aircraft Depots were adjusted accordingly, both units comprising 43 officers and 1,697 other ranksAIR1/1084/204/5/1721.
[24] The RLP's were initially established with 30 lorries and 24 trailers, but an additional section of 15 lorries and 12 trailers was authorised in February 1918. Raleigh & Jones, *op cit,* page 353.
[25] The French also organised their aeronautical supply on the RFC system with '*Grand Parcs'* and '*Parcs'* matching the roles of the depots and air parks in support of the individual *escadrille*.
[26] In October 1918, some 200 aircraft were repaired or rebuilt from salvage compared to the 3,756 built that month.
[27] A total of 131,339 tons of aircraft stores was shipped to the RFC in France over the course of the war, as well as 2,103 aircraft in crates (the large majority of aircraft were delivered by air, however) *Statistics of the Military Effort of The British Empire.*
[28] Report On The Inter-Allied Board of Supply, Chapter XVIII, Section 6 – AIR2/151/290308/20.
[29] According to the scheme for the permanent organisation of the RAF published on 13 December 1919.

RAF LOGISTICS PLANNING IN THE INTER-WAR YEARS: AN INTRODUCTION[1]

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In the short span of this paper I cannot deal with POL, rations, medical, and armaments logistics planning, topics covered to some extent as they related to aerodrome building in my forthcoming *The Bases of Air Strategy.* I have chosen, therefore, to concentrate on certain neglected aspects of aircraft procurement and the reasons therefore.

The art of strategic assessment was not well practised in Britain before World War II with the result that the actuality of the worst possible case was never considered – the loss of France in 1940.[2] This rendered much of the pre-war assessment obsolete. And that in turn contributed to logistical planning in the inter-war years being skewed and incomplete.[3]

Evidence for this comes both from contemporary documentation of 1919-1939 and from the obvious deficiencies uncovered both by operations and by the Inspector-General, 1939-1945.[4] And is symbolised by the lack of hand-tool kits.

The RAF came into being only on 1 April 1918 when the Great War was in full spate and the invisible infrastructure had reached wartime equilibrium. But by the end of 1918, a year of horrible attrition, the newly independent air arm was facing demobilizational instability.[5] Thereafter the RAF would live off war surplus till after 1924, thanks in part to stringent fiscal restraints.

In the meantime the Home Defence Air Force concept had been accepted by the Cabinet in 1923 and would dominate British thinking right through to 1945.[6] But no suitable aircraft were ordered until 1936, no operational studies were done to verify the likely effectiveness of the force and equipment proposed, and no air power doctrine developed.[7]

As the situation turned ugly in the early 1930s there began an expensive scramble to rebuild the defences of the world's only superpower. That latter status was soon jeopardised by the return of Nazi Germany as a European force and the parallel decline of France both as a potential enemy and as a great power. Meanwhile, in the Far East Japan had embarked on an expansion that made her a potential enemy.[8]

The year 1934 was the crucial turning point as rearmament was accepted as policy and the money began to flow. The Air Ministry budget rose from £16 million in 1932 to £450 million in 1939. And the RAF was

to be expanded from 138 squadrons of front line aircraft to 212 by March 1942 of vastly greater power.

However, by 1935 the Director of Organisation was noting that officers were badly overworked and that there was not time to do what needed to be done and that there was a shortage of staff officers, especially for mobilisation.[9] And we may add, lack of skills doubled the workload.

In 1936 the single Air Defence of Great Britain (ADGB) was abolished and replaced with functional commands – Fighter, Bomber, Coastal, Army Co-operation, Training, and Maintenance (the latter, however, not coming into being till mid-1938). The official emphasis was on Fighter Command to protect the Home arsenal, but Bomber Command was still powerful.[10]

Concurrently with the amorphous appointment of a Minister for the Co-ordination of Defence came the beginnings of the six revolutions that would radically change the RAF by 1945. These were the technical or technological revolution in aircraft engines, and fuels, the switch to all-metal aircraft construction, the necessity for hard-surfaced airfields, the rise of electronics, the appearance of the jet engine, and early computers; not to mention the mechanisation of war on land, at sea, and of course in the air. All of these demanded great increases in personnel, aircraft, armaments and spares, much greater lead times, a quantitative jump in management skills, technical personnel and funds, but these were not what the previous fifteen years had inculcated. And it all took time.

Monoplanes, which had been ruled out of the British air services in 1911 as unsafe, now became the dominant type. The new machines had retractable undercarriages with brakes, flaps and enclosed cockpits, wing-mounted multiple machine guns, or power operated turrets. The 1932 specification for the Wellington twin-engined heavy bomber had called for a maximum all-up weight including 2,000 lbs. of bombs of about 6,500 lbs. In 1934 when the designers rebelled, the weight rose to 30,000.[11] And two years later the new heavies rapidly came in at 65,000lbs. plus. In contrast the existing 1934 biplane heavy bombers weighed 17,000 lbs. And it was not only the weight, but also the frequency of operation which soon demanded runways instead of grass.

Such an enormous explosion in size of the RAF with all the complications of the bamboo basket effect forced the sudden transition from a Victorian cavalry regiment to a modern armed force.

The truth of this may be seen in the RAF Expansion Committee discussions. The mention at the 120th meeting on 17 February 1938 of a

coming equipment crisis had resulted in Cabinet confiscation of the minutes. The word **spares** did not really appear logistically until the 161st meeting on 21 March 1939 when it was noted that Supermarines had been very irritated by a £250,000 order for operational spares.

That Supermarines were upset was due to the fact that they were only credited for complete Spitfires. To produce extra spares, they had to stop or divert part of production. For proprietary reasons, they did not wish subcontractors to handle spares. This remained a problem into 1943. It also complicated logistical planning. The first mention in the Air Council Supply Committee, established early in February 1938, was not till 19 October 1939 and then merely of four sets for the Whirlwind fighter.[12]

The immediate impact of Expansion was a repeat of the aeroplane-counting prior to the 1914-1918 conflict.[13] Emphasis was laid upon front line or first-line machines without reserves. All production was aimed at countering the propaganda effect of the sudden rise of the new *Luftwaffe*. It was also abetted by the self-imposed Doomsday fear in Britain of a massive enemy bombing attack on a scale that the RAF could not have delivered. Moreover, air and ack-ack defences against this delusion were negligible. This was particularly so in September 1938 when Plans reported that Bomber Command was impotent against Berlin[14] and the Cabinet knew that the biplane fighters were running out of spares and that the new monoplane machines were unusable.[15]

In a particularly acerbic 'most secret' letter from the AOCinC Fighter Command on 16 September 1939, Dowding pointed out that the Air Council had estimated that he needed 52 fighter squadrons for the defence of the United Kingdom and that the Committee of Imperial Defence had approved this. He noted that due to the BEF going to France his force was to be reduced to 26 squadrons and the Hurricane production was only two per diem. He then took out his wastage tables and found that the four 'field force' squadron sent to France would require 60 replacement aircraft per month, or 20 more than new production. And at Home he needed 184 new Hurricanes a month. If SD 98, he noted, was correct, his Hurricane force at Home would be extinct by February 1940.[16] *(SD98, Calculations of Consumption and Wastage in War,* was still in use in 1964.)

This assessment did not overlook the ability of Repair and Salvage to supply additional aircraft. The fact was that no RSUs existed. Again, the cause for this must be sought in history. The official *The War in the Air,* published between 1922 and 1937, omits almost any account of the role

that repair and salvage played in the 1914-1918 war.[17] And on top of this, CAS, Sir Cyril Newall, commenting after a weekend's pondering the scale of reserves, thought that 225 percent would be acceptable as the factories would be up to full production within three months after the declaration of war. He was only off by a factor of about 12. Newall was, in fact, harking back to the early 1920s when it was expected that in time of war the RAF would be able to expand to 275 Squadrons in the first six months.[18]

Thus logistics planning did not take into account either the vast increased demand for spares of modern aircraft nor the possibilities which RSUs offered for supplementing production. When after the Battle of Britain, mobile repair teams took the field and crashed aircraft were sent to repair depots and civilian contractors for rebuilding, some 200-300 aircraft a month were returned to service – the equivalent of tripling the combined new production of Hurricanes and Spitfires.[19]

Nor was Bomber Command any better off. It lacked the skills and ability to do its job and it would take till 1944 to make it into an effective fighting force of 100 heavy squadrons.[20]

According to *The Shorter Oxford English Dictionary* **logistics** is the art of moving and quartering troops and of organising supplies. **Planning** is the way in which it is proposed to carry out some proceeding. To this must be added that the object of logistics is a force fit, serviceable, and ready to undertake any operations ordered that lie within its capacity and to continue to do so as long as required.

The Royal Air Force was created in 1918 as the solution to the constant competition for aviation resources between the Royal Naval Air Service and the Royal Flying Corps, between the Admiralty and the War Office. During the last year of the war the wastage of fighters in Europe was 66 per cent per month while overseas the rate was reckoned at 20 per cent.[21] The latter did not take into account **pipeline purdah –** supplies en route.

After the war the RAF was governed by 1917 attitudes until 1934, by which time it had perfected 1917 in terms of biplanes and colonial policing. That this happened can be blamed upon peacetime equilibrium, upon the Ten Years' Rule, placed on a rolling basis in 1928 and unclear as to whether preparations for war were to start or hostilities were expected to occur at the end of that time.

Under these and other circumstances CAS, Air Chief Marshal Sir Hugh Trenchard, concentrated upon a reliable, serviceable fighting force.

To this end he founded No 1 Technical Training School at Halton on the

well-established boy-apprenticeship basis.[22] As with flying personnel, the system was basically regimental. Fitters and riggers did three years at Halton before posting to a squadron. It was a fine system which relied upon Senior NCOs to run it to technical perfection. The difficulty arose after 1934 when the RAF was forced to expand rapidly and the whole system was diluted so experience declined. Pilots could be trained in about 18 months, but fitters and riggers were thought to need at least seven years.

Next, Trenchard's air force undertook the development of engines from their 2 hours and 44 minutes between breakdowns of World War I to a magnificent 1,700 hours. The series of confidential reports show that engine failure was a primary cause of accidents. But the reports also show that within three years of being brought into service, new types of engines could be considered reliable and thus serviceability rates rose accordingly.[23] Interestingly, and apparently due to two causes, airframe life was not questioned until late in the 1930's, when it was abandoned. It seems that very little of the damage to airframes was thought to result from design, manufacture, or workmanship failures. Conversely, it was generally assumed that those aircraft accidents not caused by engine failure were due to pilot error.[24] At the same time in the civilian world, the making public of aircraft accident reports was debated until 1936 when the public good finally overwhelmed manufacturers' pressures not to indicate that a type could have a fault.[25]

The three years it took to settle engines into service meant that the needed stocks of spares could not be known for 36 months or more. Engine spares were easier to order than airframe ones as they came in replaceable parts anyway. But both were required in anticipation.

As in many organisations the RAF mindset was annual and few apparently did projections. Those that were made seem not to have been based on sound appreciations, and the concern always was with aeroplanes which seemed to assume all the rest which would be needed could be obtained by channels and methods of supply.

Having made engines more reliable the Service then failed to apply the benefits of these improvements so as to save labour or inspections. The culprits were the slow pace of peacetime, the fact that the maintenance was NCO-dominated, and the general lack of awareness of business methods and analysis even though cost-accounting used in the Ministry of Munitions in 1918 had its origins in American railroad management of the 1850s.[26]

This failure to cut down inspection times was criticised by the 1939

Brigadier H A Jones Committee on the Administration of the RAF.[27]

Given the very small size of the RAF from 1919 to 1934 and the limited number of any type ordered, airframe firms could make spares after the type was in service and the Air Ministry could take 18 months to assess consumption before ordering enough for what it considered to be the likely useful life of the machine.[28] The whole was compounded by the fact that the private designer was the one who determined the likely need for spares and his firm did not do this until production had started and they knew the likely operational role of the machine. And the Director of Equipment could not start to order until he had the list! Planning was thus rather simple and parsimonious.

Trenchard also established the Royal Air Force College at Cranwell to train 18-year-olds to become officers, gentlemen, and pilots. Only rudimentary instruction was provided in technical and engineering matters, while short-service commissioned officers were limited to piloting.[29]

In the meantime, as far as is known, the RAF drew no lessons from its experience in the 1914-1918 War. Some studies may have been done incidental to another purpose, such as the one on flak released under the aegis of the Chief of the Air Staff in 1933, wherein he lamented that fifteen years after the Great War no one remembered it.[30] So far no others have surfaced.

The inability to transition from past peacetime practices to rapid growth can be seen in the minutes of the RAF Expansion Committee where the air marshals concentrated in their weekly survey of aircraft production on the details which were delaying the delivery and in-service dates of new types rather than either upon planning for their demands when fully operational or the needed operational doctrine. Under all these circumstances it was no wonder that logistical planning for other than front line aircraft was non-existent until the creation of the Air Council Supply Committee on 29 April 1938. It then held 100 meetings by the outbreak of war, the results of which were not fully in train until 1942 and heavily weighted to production. Peacetime, as Dowding noted re the 1939 Air Defence manoeuvres, threw an unwarlike cloak over the Service's activities. Even after Munich the war establishment of Maintenance units had not been prepared.[31]

From 1918 both maintenance and servicing were the domain of the Director of Air Stores, Parks, and Equipment in the Department of the Controller-General of Equipment at the Air Ministry. As a result aircraft servicing was delegated to unit commanders with virtually no direction

from the Air Ministry. So COs depended upon advice from senior NCOs, tradesmen pilots, and the few General Duties officers with an engineering background. To stop this Balkan state of affairs GD officers were recruited into the Technical Branch as engineering, armament or signals specialists. But extra pay and a regular commission did not guarantee competence or interest.[32]

In the meantime in 1923 it had been laid down that officers were responsible for their aircraft's daily, weekly, and 40, 80, and 100 flying hour inspections and other checks at calendar intervals. However, they were not told how. So the next year the unit was made responsible. Not until 1929 did the AM issue a standard servicing schedule.

In the early 1930s aircraft designers were ahead of RAF technical services and so the Deputy-Directorate of Repair and Maintenance in Equipment was established under Group Captain Roderic Hill, who in 1948 became the first Technical Member of the Air Council, when at last the need for efficient technical services in the RAF had been noted, but the reality on aerodromes was a shambles. So finally, in 1936 a Director of Repair and Maintenance was appointed in the Air Ministry and five repair depots proposed.

The reason there was no logistics planning in the inter-war RAF is even more complicated. The Service was divided socially and intellectually as well as by rank. Most officers were pilots and their concerns were airframes, engines, and armaments only in so far as these affected how they could do their job. The technical side was in the hands of senior NCOs and airmen. Both groups had a narrow, in-service perspective as is seen in the pages of *The Royal Air Force Quarterly* with its many articles on travel and hunting and its paucity of professional pieces on doctrine or supply.

This Victorian milieu was complicated by the fact that, unlike railways, there was no chief designer or mechanical engineer who oversaw the technical structure of maintenance, supply and servicing.

The study of SD 98 reveals a lack of interest in the theory of probability as opposed to certainty. In spite of the fact that the Great War had shown and *The History of the Ministry of Munitions* had recorded, the sums that needed to be done to deal with not only wastage, but also serviceability, these were neglected. Bombs were untested and bombing was assumed not only to be absolutely accurate when compiling tables, but also the laws of probability were not applied either in regard to the effectiveness of the weight to be dropped nor as to impact.

When none of the above were taken into account, let alone all, no sense of the magnitude of wartime supply could be applied to logistical planning.

And once it became clear that a war was likely, everyone was too busy to get down to basics. As the Director of Organisation had noted in 1935, the staffs were pressed to the limit even as Expansion began. And AP 1561 of 1936 makes this plain in its catalogue of how few officers could be sent on courses. (AIR 10/2147)

Aside from our knowledge of the deterrent Home Defence doctrine, there is little evidence that the squadrons called for had clear roles to play. And until these had been seriously studied within the grand-strategic, strategic and tactical contexts, supply planning had no basis.

AMSO declared in 1939 that all that had been created by the Expansion Schemes was a militarily unsound facade with a practically non-existent foundation.

One result of this was on the one hand to be seen in serviceability rates in the summer of 1940 when Fighter Command had 75 percent availability during the Battle of Britain, Bomber Command 82 percent (except for the light bombers of No.2 Group which stood at 106 percent), and Training Command at 59 percent.[33] On the other hand, indicative of a lack of logistical planning was the Inspector-General's string of reports on unserviceable aircraft at station after station due to shortages of spares or lack of tool kits, not to mention the use of skilled fitters and riggers to do guard duty and to fill in bomb craters.

The combination of new modern types and the exponential complications of a rapidly expanded and diluted force quickly revealed the weaknesses in the lack of pre-war planning. Part of the story also came from a dearth of experience and awareness of the time it took to place an order and have stocks processed through the new depots and available for issue. Items were sometimes in the pipeline or even in the depot, but not yet registered by hand on the inventory. This resulted in an AOG (aircraft on the ground) order to the manufacturer who had to drop everything to fill it, thus disrupting production.

Lack of logistical planning was evident in the more distant theatres in part due to the fact that some of them were never before the war envisaged as such and others because the closing of the Mediterranean meant that goods spent an unexpectedly long time in pipeline purdah. Two examples must suffice. The AOCinC Middle East, Sir Arthur Longmore, got the blame for complaining about lack of aircraft. But it was April 1941 before

London realised that of 1,786 aircraft allocated to Middle East Command since November 1940, only 300 had arrived and they all needed overhauls in a theatre without the infrastructure at Home.[34] In SEAC in 1943-1944 No 27 Squadron's Beaufighters flew only once every 18 days, clear evidence of lack of planning, amongst other things.[35]

Apart from the well-known need to double the supply of oxygen masks to Bomber Command crews due to icing up, pre-war planning failed to take into account the medical conditions and logistical necessities of campaigns abroad. Sickness rates in the Middle East, Greece, and India required many more bodies in theatre than initial establishment tables might have indicated. Sickness in the Far East was such that, in effect, more than the entire RAF personnel and necessities area had to be replaced. This doubled the logistical loads in many human resources and necessities areas.[36]

Just as war-surplus deadened innovation after 1918, so the large stocks of .303 ammunition delayed the adoption of cannon until the beginning of the Battle of Britain. At the same time fuel and lubricants (POL) planning was complicated by the switch from the relatively new 87 octane fuel to the even newer 100. This necessitated not only planning for manufacturer's modification of engines already in service, but the accumulation of benzene and other refinery facilities as well as of special storage, rail tank cars, and pipelines to move incoming POL from the docks and refineries to airfields. In this latter area as well as in ordnance the RAF was sometimes better off since planning was undertaken by high-powered committees of specialists outside the Service.

One other explanation for why the RAF was not more skilled at logistical planning is that the peacetime emphasis was on flying and flying careers. For example, Air Chief Marshal 'Bing' Cross was a wing-commander before he was posted to a non-flying position – as an Intelligence Officer, a field of which he confessed he knew nothing.[37]

The number of staff or administrative college trained officers appearing in the *Lists and Distribution of Duties* is minute.[38] Serious planning only appears to have begun with the Harris/Slessor assessment of the effectiveness of the deterrent Home Defence Air Force delivered to Prime Minister Chamberlain the week of Munich, September 1938.[39] At the same time, as noted earlier, the Prime Minister already had known since February that Fighter Command would at that moment be impotent because of a lack of spares for the biplanes and lack of familiarity with the new monoplanes. Hence his policy of appeasement.

The RAF ran on its own inertia. A lot of what was needed was routinely ordered and the service functioned. But what appears to have been lacking was a sophisticated planning process based upon a refined doctrine and rigorous operational evaluations. The air exercises not only were too short; they assumed a continuation of the Western Front of the previous war. It seems also to have been assumed that if aircraft were provided all else would fall into place. The period of Expansion in reality was one of changing from Victorian to modern patterns.

Thus, my tentative conclusion has to be that serious logistical planning did not really occur until after the war started and took two years to be implemented.

So, what lessons, then, can be drawn from the past that may be worth remembering for the future?

1. Past surpluses can cast a pall over innovation and lead thus to future supply crises.
2. Institutional memory dims rapidly, especially if continuous use is not made of either the Air Historical Branch or through the encouragement of studies such as those being undertaken by AVM Tony Mason and Group Captain Peter Dye.
3. Planning requires the continuous anticipation of trouble so as to avoid it.
4. Aeronautical, and thus RAF, history is as complex as both the bamboo basket and the cube indicates. It is part of the vast field of human progress and is affected and afflicted by what happens elsewhere in the diplomatic, political, military, economic, medical, scientific, technological, social and ideological areas.
5. Even today, of course, well-trained people are still human.
6. And, lastly, as Shakespeare noted long ago, for want of a nail the shoe was lost, for want of a shoe the horse was lost, and for want of a horse the kingdom was lost. Certainly without hand tools and spares in the Second World War the RAF lacked serviceable aircraft and thus operational punch.

Notes:

[1] It is ironic that we have a better knowledge of the logistical arrangements of the Luftwaffe,

1935-1945, than we do of those of the Royal Air Force. That this is so is thanks to the Director of Equipment at the Air Ministry who in 1945 asked the Allied occupation team to obtain this information for future reference. Air Division, Control Commission For Germany, British Element A *Study of the Supply Organisation of the German Air Force* 1935-1945 (June 1946)

Though both Allied and enemy forces did their best to destroy these seemingly unimportant records, the Air Ministry Archives and the PRO appear to have done an even better job on the RAF materials than did their enemies. And there is no special Air Historical Branch study of logistics other than *Maintenance* (1954).

During World War II the Air Ministry is estimated to have raised two million new files, not counting the pre-war ones, in which I am primarily interested. The current situation is that since the 1939-1945 records were opened in 1972 it has been possible to locate operational records books and their appendices, policy directives, and the like, but very difficult to find the records of the Air Ministry Statistical Office, or equipment records of many kinds. For instance, I have only just (Aug 1997) come across a reference in the minutes of the RAF Expansion Committee, 1936-1941 (otherwise known as the Air Council), to the fact that there was an Air Council Supply Committee. Its minutes, hopefully, will enable me to fill in many pictures on the engineering side, including why there was a shortage of fitters' and riggers' toolkits well into 1943 in South East Asia Command.

The perennial shortages of spares, a very vital part of logistics, fortunately, can be verified from the reports of the Inspector-General (AIR 33) and from the immediate post-war Ministry of Aircraft Production history of the matter found in the AVIA 46 series.

Memoirs make clear another aspect of the problem – most RAF officers were pilots and we pilots simply assumed that our machine would be ready when needed. There was a chronic shortage of engineering officers even after they were brought in as specialists and placed in charge of that side of station activities from 1938. *Malheureusement,* their reports, which we know from the Australian Flying Corps in the Middle East, 1916-1918, should exist, appear to have been destroyed. In contrast to the above, when I was working on the official history of BOAC 19611978, all of those records were available to me and on short notice.

[2] N H Gibbs, *Grand Strategy* I, (London 1976) and Robin Higham 'Worst Possible Cases,' *Australian Defense Forces Journal,* No. 100, May/June 1993, 63-65.

[3] Robin Higham, 'Royal Air Force Spares Planning in World War II, ' [USAF] *Journal of Logistics,* Spring 1996, 23,26.

[4] The vast AIR collections in the Public Record Office are described in the PRO pamphlet 16, 'Operational Records of the Royal Air Force,' which says nothing about maintenance, and in *Records of Interest to Social Scientists,* 1919-1939: *Introduction,* HMSO, 1971, 246-256, and in The Second World War : A *Guide to the Documents in the Public Record Office,* HMSO 1971 and later, 27-48, and Susan Fowler, Peter Elliot, Roy Conyers Nesbit, and Christina Goulter, *RAF Records in the PRO.* PRO Readers' Guide No 8, 1994.

[5] For an international perspective and bibliography see John Morrow, *The Great War in the Air,* New York, 1996. For the inter-war years see older versions of AP 125 A *Short History of the* RAF.

[6] For a general background see H Montgomery Hyde, *British Air Policy Between the Wars,* 1918-1939, London, 1976, Scot Robertson, *The Development of RAF Strategic Bombing*

Doctrine, 1919-1939 (Westport, CT, 1995), Malcolm Smith, *British Air Strategy Between the Wars,* Oxford, 1984, Robin Higham, *Armed Forces in Peacetime, Britain* 1918-1939, London, 1963; *The Military Intellectuals in Britain* (New Brunswick, NJ: 1966) and for an overview *Air Power: A Concise History* (1972, 1984, 1988, and 1998).

[7] See the Putnam series, especially the volumes on Avro, Bristol, Fairey, Handley Page, and Vickers and RAF Museum Archives RAF Sd.146 (2) *Report on the Bombing Trials at Gretna Gren, April* 1939.

[8] See the official history by S Woodburn Kirby, *The War against Japan,* I, HMSO, 1957.

[9] Air 2/8875 of 12.7.35.

[10] See Robin Higham 'The Royal Air Force and the Battle of Britain,' in B Franklin Cooling, *Case Studies in the History of Air Superiority,* Washington, 1995 (though written in 1985) and John Ray, *The Battle of Britain: New Perspectives.* London, 1994.

[11] AIR 6 and AVIA 10/163, AVIA 46/121, Biography of the Wellington.

[12] The Air Council Supply Committee minutes are in AIR 10/154. For the Air Historical Branch narratives see AIR 41.

[13] On this see Robin Higham, *The British Rigid Airship* 1908-1931: A *Study in Weapons Policy* (London, 1961), 30.

[14] See Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany,* 1939-1945, I (HMSO 1961), 1-132.

[15] Air 6/15-72. Royal Air Force Expansion Committee, Minutes of the 120th meeting on 17 February 1938.

[16] Copies of SD98 are in AIR 10/1522. Dowding's letter is in AIR 16/677. We know little about the creation in 1934 of AMM 50 and of SD 78, the predecessors of SD 98. The origins probably go back to 1924. The purpose of this document was to enable commanders, such as Dowding before the Battle of Britain, to calculate consumption and wastage at various levels of operations from intensive on down. Up until Expansion began in 1934, the CD and SD series were given new numbers each time a fresh edition of the document appeared. However, with SD98 the number remained the same, but there were many variants. In typical service fashion, by 1942 the extant 1936 edition had been reduced from 120 pages to just over 40 as pages were deleted and others substituted. On the history of RSUs see AVIA 26/286.

[17] See VI (1937) 92-100. My thanks to Group Captain Peter Dye for recalling this to my attention. Unfortunately the ORBs and other materials on this side of the 19141918 War cannot be found, including those of No 1 Aircraft Depot in France.

[18] AIR 9/50 covers 1924-1937.

[19] One of the research mysteries is what has happened to the Air Ministry Statistical Office records. Scattered information is in 'Daily State' and other tables found in AIR 22, which also includes personnel numbers. Some of these materials are now in the Ministry of Aircraft Production AVIA files at the PRO. An insight into the process of repair is to be found in AVIA 46/286 'Review of Repair and Maintenance Organisation Operating in the UK' (apparently August 1942). The holdings of No 41 Group ASUs as variously reported are summarised in AIR 20/1825 and on air frame repairs AVIA 46/168.

[20] See both Webster and Frankland (n.13) and the Sebastian Cox Edition of Sir Arthur T Harris' *Despatch on War Operations, 23 February 1942 to 8 May 1945,* London 1995, and Robin Higham, 'Revolutionary Innovation and the Invisible Infrastructure: Making RAF

Bomber Command Efficient, 1939-1945' a forthcoming chapter in Roger Launius, tentatively titled, 'Innovation in Aviation' (College Station, TX 1998).

[21] *History of the Ministry of Munitions* XII (1920). The pagination is by sections, but this whole volume is devoted to ack-ack and aviation supply.

[22] F J Adkin, *From the Ground up,* Shrewsbury, 1983 and Wing Commander Joe Northrop, *Joe: The Autobiography of a Halton Brat,* Worcester, 1993.

[23] Confidential reports on engines annually received a new number. They are in AIR 10/15 – Engine failure reports were issued half-yearly starting in 1925 as secret documents with irregular numbering until July-December 1934 when they became SD97. Similarly there is a series of reports on airframe wastage starting with SD28. There was also a series reporting on flying accidents that started in 1924. In 1935 forced landings were classified off of Form 764 by the Directorate of Technical Development and Equipment. For detailed annual analyses for each year see AIR 10/1566 (for 1933/34, for instance)

[24] Airframe accidents are in AIR 10 as noted in n.21.

[25] The first was Cmd 5220 (1936) on *The City of Khartoum.*

[26] 'The Saga of Servicing,' *Air Clues,* 1 June-August 1948 19-21; II July, 8-9, and III August, 1921.

[27] Air 2/2910. *Report of the Committee on Royal Air Force Administration,* 1939, see the Ministry of Aircraft Production history of spares (AVIA 46/), and for the ridiculous case of Rolls Royce having to get back its own spares to repair engines AVIA 46/168.

[28] AVIA 46/35.

[29] E B Haslam, *The History of Royal Air Force Cranwell,* London, 1932.

[30] Air 2/2727,2918, 1919. Reading the reports on the Air Exercises can be most instructive. See AIR 2/2974 the 1938 Home Defence Air Exercise or AIR 2/3491 for 1939.

Incidentally, even though in 1919 experienced airmen had testified that 12,000 feet was the worst altitude at which to fly when 'archie' was present and below 2500 feet in hilly country the best, the RAF persisted in flying at the higher level. (AIR 10/1524. SD80 *The Effectiveness of Modern Anti-Aircraft Fire (1933).*

[31] AIR 10/154 and AIR 20/230

AIR 8/475 Tables of Daily/Monthly Serviceability and the attached lists of spares deficiencies. Also n.26.

AIR 2/8875 (12.7.35).

Robin Higham, *Diary of a Disaster.* Lexington, KY, 1986, 223-224.

David J Innes, *Beaufighters Over Burma: No 27 Squadron RAF, 1942-45*. Poole, 1985.

S/Ldr S C Rexford-Welch, *Royal Air Force Medical Services,* 3 vols, HMSO 19541956.

Straight and Level. London, 1993.69.

The Lists and Distribution of Duties were the handbooks on Air Ministry organisation and can usually be used in combination with the *Air Force Lists* to see who was in what department, etc. An historical guide is forthcoming. Also useful are three AHB publications – *Members of the Air Council, Home Commanders of the Royal Air Force since 1918,* and *Overseas Commands of the Royal Air Force since 1918.* (NB. By 1937 'Channels and Methods of Supply' was no longer included in AP1081, RAF *Pocket Book,* as it had been in 1928. See also AIR 10/2147).

See Webster and Frankland, I, 90-101.

[32] AIR 8/475 Tables of Daily/Monthly Serviceability and the attached lists of spares

deficiencies. Also n.26.
[33] AIR 2/8875 (12.7.35).
[34] Robin Higham, *Diary of a Disaster.* Lexington, KY, 1986, 223-224.
[35] David J Innes, *Beaufighters Over Burma: No 27 Squadron RAF, 1942-45*. Poole, 1985.
[36] S/Ldr S C Rexford-Welch, *Royal Air Force Medical Services,* 3 vols, HMSO 19541956.
[37] *Straight and Level.* London, 1993.69.
[38] *The Lists and Distribution of Duties* were the handbooks on Air Ministry organisation and can usually be used in combination with the *Air Force Lists* to see who was in what department, etc. An historical guide is forthcoming. Also useful are three AHB publications – *Members of the Air Council, Home Commanders of the Royal Air Force since 1918,* and *Overseas Commands of the Royal Air Force since 1918.* (NB. By 1937 'Channels and Methods of Supply' was no longer included in AP1081, RAF *Pocket Book,* as it had been in 1928. See also AIR 10/2147).
[39] See Webster and Frankland, I, 90-101.

THE INVISIBLE INFRASTRUCTURE

PRIME MINISTER

Minister of Aircraft Production

Ministry of Labour and National Service

Manpower committees

Labour Pool

Raw Materials

Airframe constructor

Engine Manufacturer

Ancillary supplies

Armaments suppliers

Bombs

POL (petrol, oil and lubricants)

Sea transport

Pipelines

Refineries

Airfield construction companies

Concrete and steel supplies

Rail Transport

Motor Transport

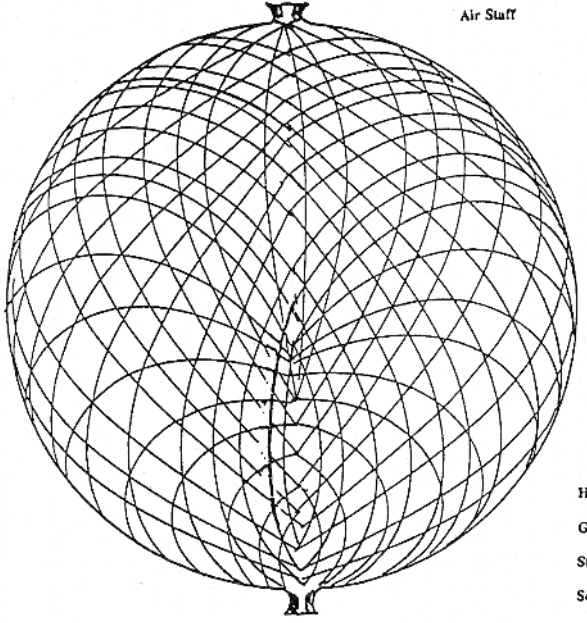
Food (rations)

Land survey

Secretary of State for Air

Air Ministry

Air Staff



AIRFIELD

Mechanical resources

Billets and Housing

Medical resources

Training

Aircrew

EFTS

SFTS

Navigator

Bomb Aimer

Air Gunner

W/Op

Radar/Nav

Flight Engineer

Ground Crew - Fitters, Riggers, Radar Mechanics

Specialist Schools

HQ Bomber Command

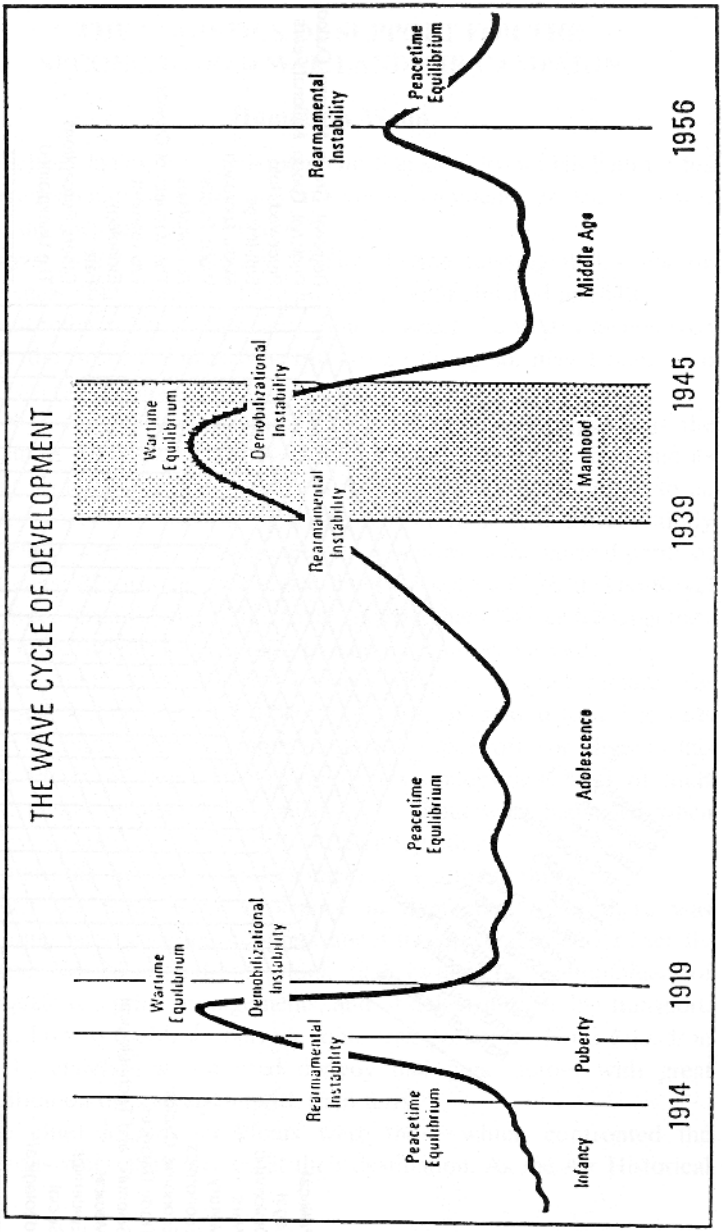
Group HQ

Station HQ

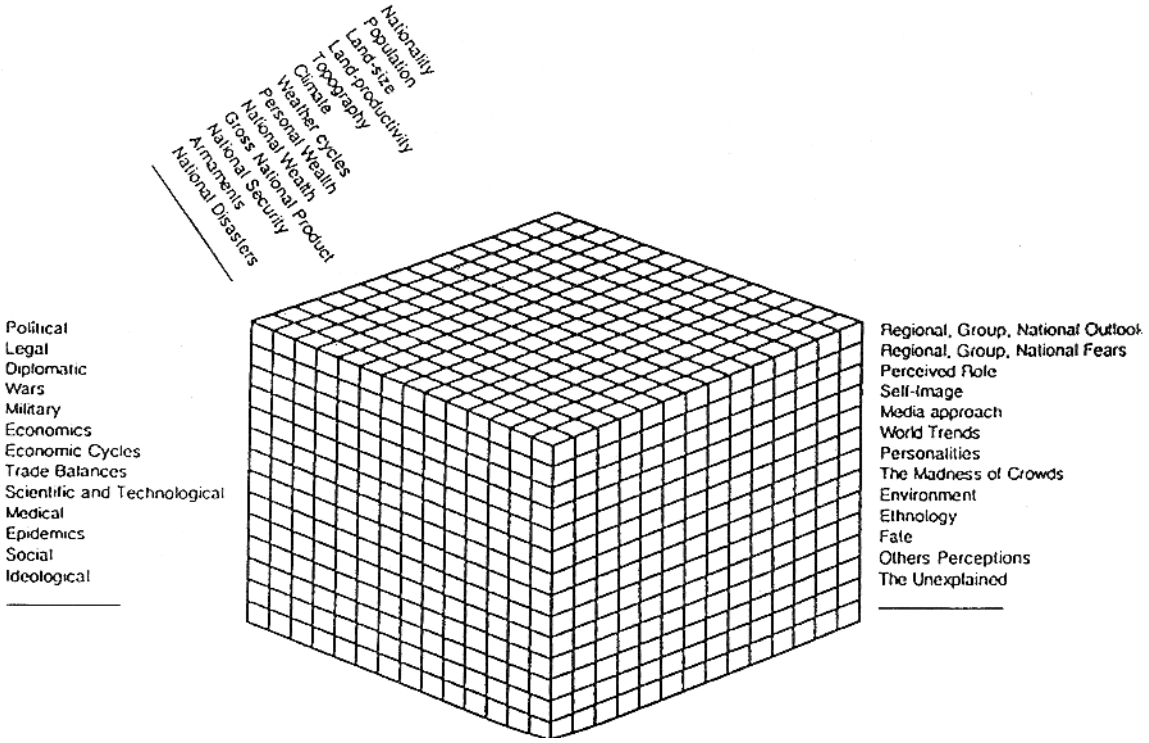
Squadron

OTU

HCU


THE WAVE CYCLE OF DEVELOPMENT
Infancy
Peacetime Equilibrium
Rearmamental Instability
Wartime Equilibrium
Demobilizational Instability
Puberty
Peacetime Equilibrium
Rearmamental Instability
Wartime Equilibrium
Demobilizational Instability
Adolescence
Manhood
Middle Age
Rearmamental Instability
Peacetime Equilibrium
1914
1919
1939
1945
1956

Cause and Effect Cube



THE LOGISTICS OF SUPPORT FOR THE SECOND WORLD WAR LAND-AIR CAMPAIGN

Humphrey Wynn

Sir Michael, ladies and gentlemen. Our thanks to Robin Higham for his characteristically pertinent and analytical comments on the inter-war years: my own are more anecdotal.

I must correct his literary allusion to the missing nail – not by Shakespeare but a proverb from an Anthology published in 1640.

I will refer to 12 land/air campaigns in which the RAF was involved during the Second World War. But before doing so, may I make two broad overall comments.

The first is that, underpinning most of these campaigns was the heroism of the Merchant Navy with its (mainly) unarmed ships and its valiant protection by the Royal Navy. If supplies had to be got to an overseas theatre of war, the merchant seamen took them there, entirely vulnerable to torpedo or bomb attack, as well as to the normal perils of the oceans. RN warships defended them as best they could. The Royal Air Force eternally salutes the Royal and Merchant Navies for what they did to bring aircraft and supplies to where they were needed.

The second comment is that I found, when doing some research for this paper, that there is a great dearth of information in historical records of the Second World War about logistics – as Professor Higham has found. Plenty on high-level planning, on strategy at Chiefs of Staff levels; plenty on operations and tactics – about what happened when strategy was put into effect: very little on logistics.

Perhaps this Seminar will do something to remedy this.

When the RAF went to France in September 1939 there was something of a peacetime progress about the move across to a friendly country. No 26 Squadron, which had Lysanders, 'complained of inadequate reception arrangements, and of delay in receiving transport. It was, however, able to borrow some transport from No 2 Squadron (*also Lysanders*), whose road convoy had gone across with great expedition on the Dover-Dunkirk train ferry.'

The chief logistic problems were those which confronted the squadrons when they arrived at their destination. As the Air Historical Branch Narrative (just quoted) further comments, successful arrival and swift preparedness for operations did not imply that this was achieved without

difficulty, for 'with one or two exceptions, there were no permanent buildings on the French aerodromes, which for the most part were remote from all save tiny villages. The absence of the bulk of the transport at this stage was thus acutely felt, and the Billeting arrangements proved awkward. Much seems to have depended on the degree of efficiency of the local French Air Company.' No 71 Wing, which had Battles at Bétheniville, seems to have been particularly unfortunate. The Wing recorded that 'the French Air Company . . . were expecting only five officers and 30 ORs . . . The total personnel who arrived by air . . . , including the Servicing Flights, were 29 officers, one WO, 52 Sergeants and 143 airmen . . . Two tents only were provided on the aerodrome, one of which was occupied by the French guard.'

There were similar troubles for No 74 Wing at Challerange, where the Battles flew in on 2 September: 'On arrival it was found that the French Air Company had made no arrangements at all for the reception of the formation, apart from the installation of a highly inefficient telephone system.' For the whole of the ensuing week, 'the entire time of all officers was devoted to a constant struggle with the administrative problem, due to the complete breakdown of the organisation which ought to have been devoted to the accommodation and feeding of the troops. At one time starvation point was almost reached . . . This failure appears to have been due to a violation of the fundamental principal that supply and operations cannot be divorced' – surely a *leit motiv* for this Seminar.

It is noteworthy that No 71 Wing complained that the officer i/c the French Air Company at Béthenville 'had no knowledge of the various details of administration and organisation as laid down in AASF Administration Instructions (War) . . . The Air Company as a whole appeared to be completely without orders from higher authority and did not know . . . what was expected of them.'

Other wings fared better: at Auberive, where Nos 88 and 218 Sqns (Battles) were based, they and No 75 Wing made no complaints. 'The French Air Company had arranged billets for officers in a Café and for the men in outhouses and barns,' says the Narrative.

The logistic problems which beset the RAF in France in 1939 were largely of a bureaucratic and linguistic character: it could not expect to find the same amenities it enjoyed on its home bases.

It had plenty of time to sort out its problems and become acclimatised and endure the long, bitter winter of 1939-40 before the storm burst upon it

in May 1940: but that is another story.

France had been entered as an Allied country: there was no enemy opposition. A different and terrible story unfolded from April 1940, when Britain went to the aid of Norway. In that brief and ill-fated campaign every possible logistic obstacle presented itself – a very mountainous country already occupied by the enemy, a severe climate, no available airfields. In those circumstances it is a wonder not only that the RAF was able to achieve so little at such great cost, but that its personnel were able to achieve anything at all.

Bomber operations could be conducted from bases in the UK: fighter/interceptor operations could only be flown from bases in Norway itself, by Gladiator and Hurricane squadrons transported there in aircraft carriers.

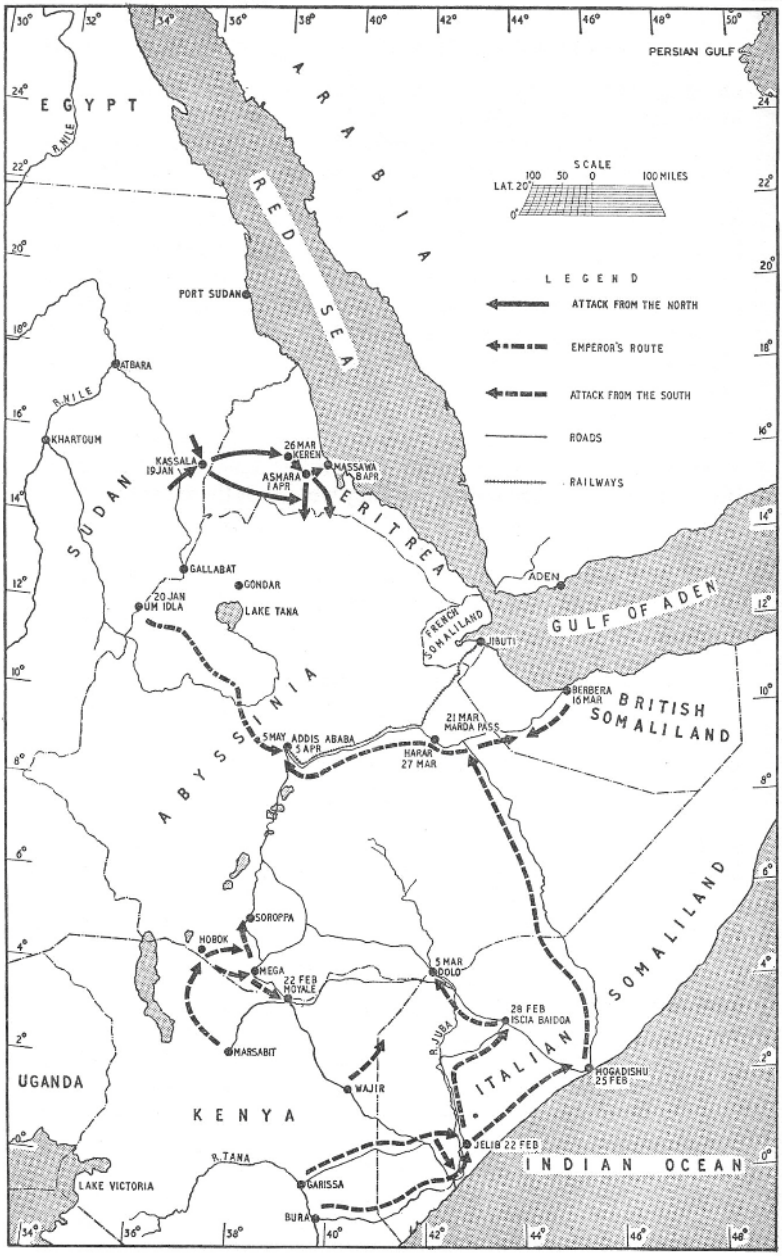
But – and this is the core of the logistic problem – you cannot deploy a squadron without an airfield, air and ground personnel, fuel, armament, spares, communications, radar and D/F equipment; and the greatest of these problems, in Norway, was airfields. We have all heard the story of how Squadron Leader Whitney Straight surveyed two possible ones – both frozen lakes, one of them free from snow, and how the Air Staff approved his second choice – Lake Lesjaskog, south-east of Aandalsnes, with which it had a good road connection, but it was snow-covered; and how he got together 200 civilians, in a sparsely populated area, and got them to clear a runway through two feet of snow which covered the ice.

An advance party under Wing Commander Keens went from Aandalsnes to Lake Lesjaskog to set up servicing facilities there, but when servicing equipment arrived at the port, every box had to be opened to examine its contents, because no schedule had been provided, and only two lorries – impressed from the local population – were available to transport it, for the British had none.

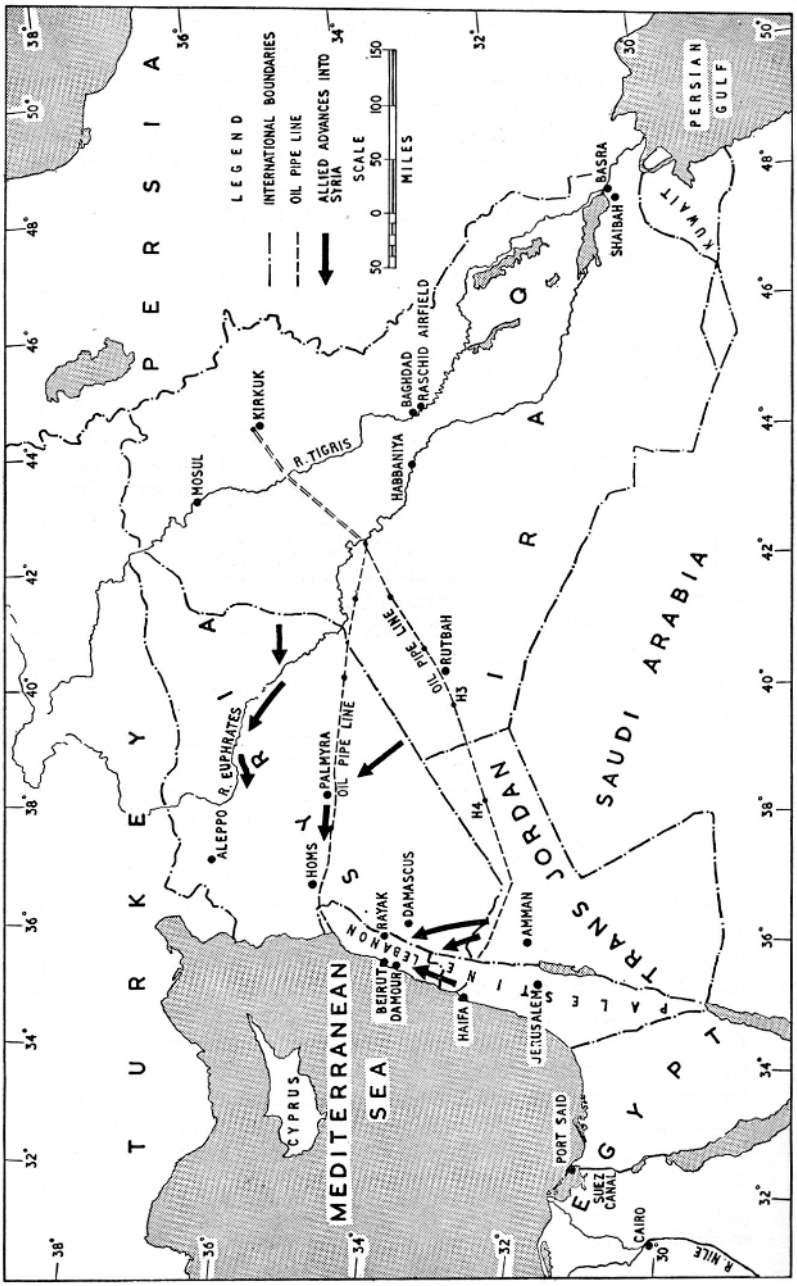
But by midday on 24 April the Wing Commander signalled HMS *Glorious* that the Gladiators of No 263 Squadron could land at 1800hrs.

The 18 pilots had only four maps between them, so the CO – Squadron Leader Donaldson – asked if a Fleet Air Arm Skua could lead them to the lake. They flew off the carrier and landed there safely.

Their arrival there exposed the logistic problems, chief of which was the extreme cold. The only transport available to take stores from the road to the runway was an occasional horse-drawn sledge; there was no petrol bowser and the starter trolley batteries were uncharged; there was no early-



THE CAPTURE OF ITALIAN EAST AFRICA, JANUARY–APRIL 1941



SYRIA AND IRAQ, MAY–JULY 1941

warning equipment. There was only one trained armourer in the servicing party, responsible for maintaining 72 Browning guns.

During the night a sharp spring frost froze controls and carburettors and only a handful of Gladiators got airborne. Many of them were destroyed on the ground by *Luftwaffe* attacks, its bombs also breaking up the runway surface.

When the remnant of No 263 Squadron was withdrawn and joined the Hurricanes of No 46 Squadron the RAF achieved local air superiority and the Allies captured Narvik – their only victory of the campaign, but followed by the disastrous sinking of HMS *Glorious* and the loss of both embarked squadrons. But that is another story – nothing to do with logistics.[1]

Quite different from the icy mountains of Norway was the vast scenario of East Africa where from June 1940 to November 1941 the RAF was involved in the war with Italy over vast hot deserts flanked by frontiers 1,000 miles long between the Sudan and Italian East Africa and 700 miles long between Kenya and Italian East Africa and Italian Somaliland – tremendous distances over which to support RAF, Rhodesian and South African squadrons. There was a campaign in the north, into Eritrea and Abyssinia, and one in the south into Abyssinia and Italian Somaliland. Main bases for supply were Khartoum and Aden, and the logistics were well planned, great use being made of railways to cover the enormous distances. Supplies of ammunition, bombs, spares and engines were shipped into Port Sudan – by the Merchant Navy, though (the AHB Narrative notes) these supplies were 'very erratic' –not surprisingly, considering the embattled state of affairs in the UK at that time – 'and resulted in much unserviceability and delays'. What is striking about the logistic side of the East African campaign – from June 1940 to November 1941 – is its organisation: the RAF Railhead Detachment and the Repair and Salvage Units.

The Railhead Detachment sent up supplies of petrol, oil, explosives and equipment; the Maintenance and Repair and Repair and Salvage Units moved forward with the advances, in which there was close co-operation between the Army and the RAF.

RAF Aden Command recorded that during February 1941 arrangements had been made for bombs, ammunition, fuel and stores to be laid down at Husseni and Garissa East and West. Full provision for ration supplies was made by the Equipment Staff. All squadrons had been provided with a large

number of 45 gal. petrol drums to meet their requirements for water – which had to be obtained from the Tana River or other available sources of supply. In making these arrangements the Equipment Staff faced 'considerable' difficulties. There was good co-operation with the Army, which constructed and maintained aerodromes for the Army Co-operation squadrons.

These logistics aided ultimate victory: the AHB Narrative records that 'the British conquest of Eritrea and Italian Somaliland and capture of Addis Ababa, the re-conquest of British Somaliland and the return of the Emperor Haile Selassie marked the beginning of the end of the Italian East African 'Empire' . . .'

A success; but contemporary misfortunes elsewhere. What about Greece and the logistics of that sad campaign?

Blenheim, Gladiator, Hurricane and Lysander squadrons were moved across from the Western Desert: how were they to be serviced and maintained?

The country was mountainous, the roads rough and poor; the Hellenic Aircraft Factory did not have an adjoining airfield. The solution was to send No 53 Repair and Salvage Unit across – one of those units which played such a splendid supporting role with the Desert Air Force, supplying replacement aircraft and recovering crashed ones.

But there were great servicing and repair difficulties in Greece, resulting from a lack of spares, the absence of ground equipment, bad communications and inadequate transport – for there were no up-to-date aircraft servicing vehicles: the old-fashioned three-ton lorries with which the RAF was equipped were not only unsuitable but too few in number to meet the requirements. The AHB Narrative records: 'Salvaging of crashed aircraft was mostly undertaken by small parties detached from the RSU and operating from the various aerodromes used by the RAF.' Roads between those and the RSU were mainly so 'narrow, winding, mountainous and obstructed it was almost impossible to convey aircraft larger than a Hurricane – and even these were transported with difficulty.'

As we see, the logistic problems were formidable; and as we know, the outcome of the campaign, despite great bravery, was disaster.

Not all was defeat and disaster in 1941: two land/air campaigns – in Iraq and Syria – were successful, and each had its own logistic features.

On 3 April an Iraqi politician, Rashid Ali, had seized power in Baghdad and by the end of that month Iraqi forces had laid siege to the great base at

Habbaniya – a siege which lasted until 6 May and was followed by a British counter-offensive.

This was one campaign where British forces were already in place – at Habbaniya, Shaibah and Basrah, and precautionary measures had been taken to ensure that the necessary supplies of food and fuel would be available. The details are impressive.

On 10 April a sub-supply depot was formed at Shaibah and three months' reserve rations transferred there. On the next day all reserve rations were also sent there. Meanwhile an order was sent to India – that great reservoir of supplies for Mesopotamia (as the area had been known) – for 45,000 rations at Field Service Scale.

As for fuel, DTD petrol stocks at Shaibah were increased at 24,000 gal and 10,000 gal for 100 Octane fuel were laid down for mixing with DTD 230 petrol to produce 90 Octane fuel if required.

Existing stocks of petrol at Habbaniya were sufficient, and the Aircraft Depot for Royal Air Force Iraq which was capable of performing major overhauls and repairs and replenishments of aircraft for Iraq was made normally from RAF Middle East resources. This was one land/air campaign in which, initially, the Army and the RAF were on the defensive; but once the siege of Habbaniya had been raised, they were well supplied to go on the offensive in a campaign which was successfully concluded at the end of May 1941 – a campaign for which the great base itself, and Shaibah and Basrah, had provided logistic support.

Slightly later in time – June-July 1941 – there was another limited success, against Vichy forces in Syria, which was invaded on 8 June. On the 21st Damascus (a target in the Allenby/Lawrence of Arabia campaign in the First World War) was captured; then on 4 July Palmyra fell and on the 12th the Vichy forces surrendered.

The AHB Narrative has some interesting comments to make on supply difficulties during this brief campaign, particularly in its reference to the use of railways. It also notes rather loftily, that 'there was a certain lack of co-ordination between the air and the administrative branches.'

As to the use of rail transport it points out that 'The main railway finishes at Haifa and a narrow-gauge line runs thence northwards to Beirut. All supplies had therefore to be unloaded and re-loaded at Haifa. There was often a considerable bottleneck in this process and two instances of petrol and ammunition not being loaded on to their right trains at all . . .'

Other logistic failings the Narrative noted were that 'the Tomahawks

suffered from a lack of incendiary ammunition. R/T communication between bombers and fighters was lacking.' Syria was something of a sideshow: I come now, chronologically, to consider some of the logistics of the great campaigns – in the Western Desert, in Singapore and Burma, in Algeria/Tunisia, in Italy and finally in the 1944 invasions of France – OVERLORD and ANVIL (though there are considerable differences of view about the strategic value of the latter operation – OVERLORD was the one that mattered.)

This Society has looked extensively, in its symposium of March 1992, at operations in the Mediterranean theatre, and I think no one would disagree that the turning-point for the final victorious desert campaign, as far as air supply was concerned, was the appointment in May 1941 by the AOCinC, Air Marshal Tedder, of Air Vice-Marshal Graham Dawson as Chief Maintenance and Supply Officer – a title outside the Middle East Air Staff Establishment, much to the chagrin of the Air Ministry Establishments Committee; but Tedder knew exactly what he wanted and overruled them. Mind you, a key element in the supply of new aircraft for the Middle East Air Force had been put in place in the late 1920s when the RAF surveyed an air route from West Africa to Cairo which became, in 1941-43, in Tedder's own words, 'our lifeline'. Let me recall what Graham Dawson did: again to quote Tedder, in his autobiography *With Prejudice* (Cassell, 1966), his job was 'receiving, modifying, distributing, salvaging and repairing the aircraft in the Middle East Command.' His methods were 'frequently unorthodox to the point of brutality' – but they worked. There was a continual traffic to and from the Western Desert, between the Wings and Repair and Salvage Units, and the Maintenance Units at Kasfareet, Aboukir, Heliopolis and Helwan – new aircraft being delivered, crashed or battle-weary ones flown or transported back to the Delta area. There was an engine-rebuilding factory in the Tura Caves near Cairo, and a steady supply of new British and American aircraft coming up the West African Reinforcement Route.

Of course, the RAF had been in Africa for a long time and knew what it was all about; its facilities were well founded, and it was this logistic backing which turned the tide in the final successful offensive in the Western Desert, supported by air power well handled.

In a similar way to Middle East air operations, the Burma campaign had the logistic backing of the long-established Army/RAF presence in India, with its enormous maintenance facilities; but these were largely in the West

of that vast country, designed of course to support operations on the North-West frontier in the 1920s and '30s.

Burma presented unique logistic problems, the like of which the RAF had never previously had to deal with – largely stemming from the terrain and climate.

The great base at Singapore, it had once been proudly thought, was self-sufficient and self-defensive: once it had fallen to the Japanese, the Army and the RAF had to fight their way back from the West – through Burma, which meant jungle warfare, with all its accompanying logistic problems, the principal one of which was that the 14th Army had to be supplied by air, and the air element in a thick jungle and mountainous country like Burma was full of dangers and difficulties: the logistic problems were so formidable as to be as great as those of actual combat, this was a campaign which could not have been prosecuted without close air support (by Dakotas), while the fighter and bomber elements had to be provided with airstrips, fuel, servicing, ammunition, radar guidance and command and control.

In a post-operations Despatch AOC 232 Group, Air Vice-Marshal Donald Hardman, acknowledged the contribution of 'airborne logistics' when he said that 'The whole campaign has been a striking illustration of a fact new in warfare – namely that air power can be used to transport, supply and support ground troops entirely independently of ground channels. This has been South East Asia's contribution to the art of war.'

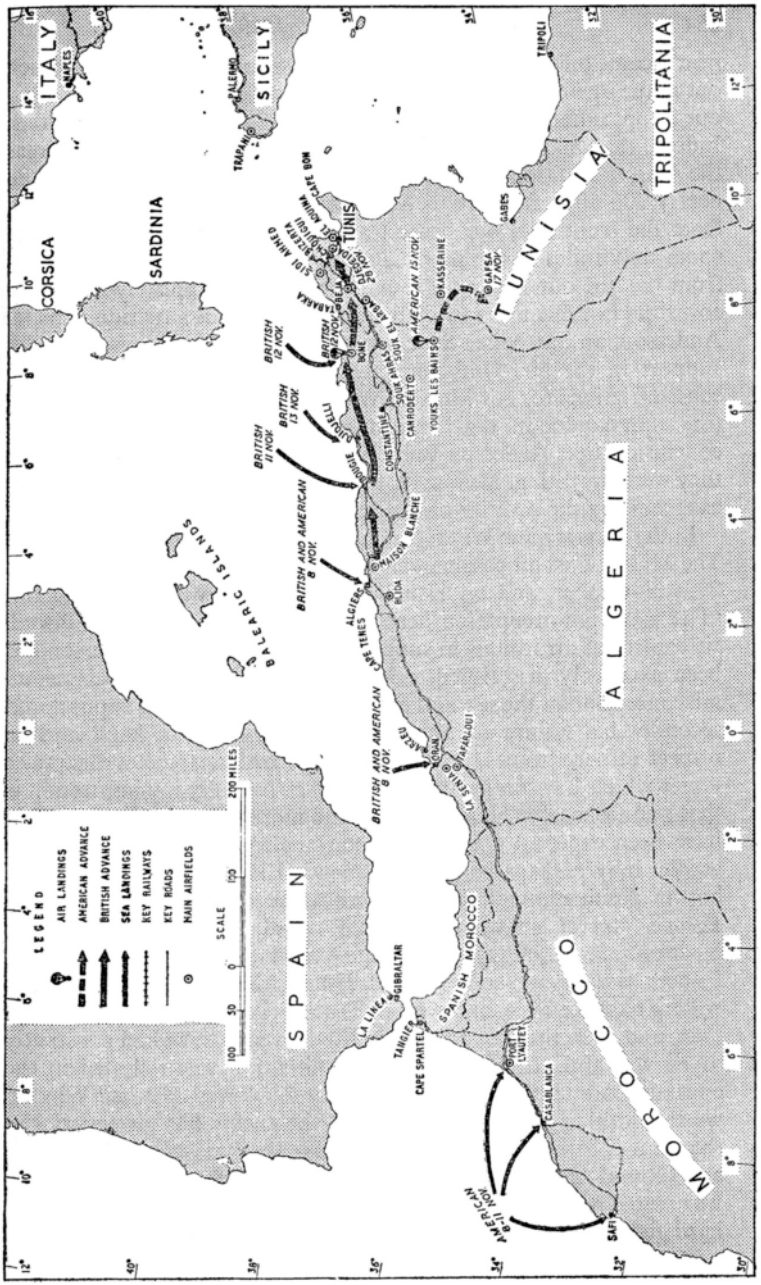
It was indeed for, owing to the savage nature of the environment in which the campaign was fought, there could have been no other way of supporting and re-supplying a moving army.

Despite the vast power base of India behind the Burma campaign there was always the pull of European/North African operations, which had priority over those of the Far East.

In November 1942 the Allies launched the first combined Anglo-US expedition of the Second World War, Operation TORCH, landings on the North African coast for an advance eastwards to Tunis to link up with the 8th Army.

The whole operation depended on Royal Navy and Merchant Navy support for the conveyance of troops and supplies, and the flying-out of aircraft to Gibraltar, which was the springboard for the whole enterprise.

Logistically, things did not go well, especially after the landing at Algiers. The AHB Narrative makes some critical comments on the RAF



OPERATION TORCH, NOVEMBER 1942

participation and emphasises the importance of Gibraltar's role in Operation TORCH: 'In the detailed RAF planning [it says] no effort was made to obtain the advice or use the experience of mobile warfare gained by the RAF in the Middle East. The methods and basis of the planning resembled those used in planning the Advanced Air Striking Force in France in 1939 [which] had not proved to be entirely successful'. In other words, nothing had been learned from past history.

Gibraltar the Narrative describes as 'the pivotal point of the whole expedition. Perhaps never in its long . . . history . . . had it played so vital and important a part. In Operation TORCH it fulfilled not only its wonted roles of a naval base and army fortress, but its new guise as an RAF operational airfield.'

From it, aircraft could be operated to support the incoming convoys – all of which had to transit the Bay of Biscay, and on it, fighter aircraft could be erected and flown off to North Africa.

Here one pays a logistic tribute to General Mason MacFarlane – 'Mason Mac' – whose 'tunnels in the Rock' greatly expanded Gibraltar's erection and maintenance facilities and gave it the capacity needed to support Operation TORCH.

It was not there but at Algiers that the Operation's logistic shortcomings were revealed. The Narrative refers to the 'chaos which reigned in the docks at Algiers for the first four weeks after D-Day . . .' There was no organisation or control. 'The war schedules of equipment . . . bore no relation to the needs of a combined operation in the early stages. The establishments laid down catered for all the requirements of a unit and not for the minimum essentials. The result was that not only were the docks swamped with piles of equipment which would not be needed for many weeks [but] as there was no means of distinguishing between cases, much unnecessary equipment found its way to forward areas in place of items which were urgently required.'

There were some compensating factors: the provision of bombs, ammunition, explosives, aviation fuel and lubricants proved adequate because allowances had been made for losses at sea which did not materialise. But losses of petrol occurred because of leakage from flimsy four-gallon tins which let in water and occasioned much engine trouble. The USAAF used 50-gal steel drums for their petrol, and had motor-driven pumps. Later in the campaign the RAF was able to obtain the loan of US refuelling equipment.

There were some ‘horror stories’ on the logistic front, like the bad packing of equipment: for example, several crates weighed 30 cwt and could only be lifted by a crane which was not available; a case weighing 28 lbs contained nothing except three linen bags, each holding ¼ lb of split pins; some not very strong 30 cwt cases were used for clothing and many were broken whilst being unloaded at Algiers, leading to the local population being conspicuously better dressed. Two containers marked ‘Acid with Care’ held MT spares; and office stationery was completely missing – having, it later transpired, been sent to Hamble near Southampton instead of to ‘Hamble’, the codename for Algiers.

But the greatest logistic hazard to the Army and the RAF after landing and facing relentless Axis counter-attacks was the dreadful weather – leading to General Mud playing his unwelcome part in the campaign.

However, as we know, the Axis forces in North Africa were finally expelled by May 1943 and Operation HUSKY – the invasion of Sicily – was launched on 10 July with Malta as an offensive base.

I will not dwell on the logistics of that campaign, under a new combined American-British command, for it is clear that the impetus and experience which had brought the 8th Army and the Desert Air Force all the way from El Alamein was a major factor in ensuring the success of the landings in Sicily – apart from the disasters accompanying the first Allied use of airborne forces.

Let me refer finally to the greatest logistic triumph of the Second World War, as far as the Allies in the West were concerned – Operation OVERLORD, with its counterpart in Southern France – Operation ANVIL, which applied overwhelming force against negligible opposition. OVERLORD was the one that mattered – the re-entry into a heavily defended Europe by massive American and British, Allied and Commonwealth air and ground forces supported by the Royal Navy. We have all seen the famous photographs of everyday scenes in Southern England prior to 6 June 1944 – washing blowing in suburban gardens, women pushing prams, while the neighbouring roads and lanes were incongruously packed with military vehicles awaiting orders to move, while newly-built airfields were crowded with fighter, reconnaissance and light-bomber aircraft maintaining a pre-D-Day offensive. This was the apotheosis of logistics during the Second World War, the biggest effort of all: we recall the deployment of the Mulberry harbour and laying of the PLUTO pipeline; by the evening of 7 June an airstrip had been finished at

Asnelles, and on the 10th the first airfield on French territory was completed, built by RAF Servicing Commandos and Construction Wings at Ste Croix-sur-Mer: logistics indeed.

Much has been written about OVERLORD, and this Society held a symposium on it at Bracknell in 1994. No effort had been spared in logistic terms to make it a success, for it *had* to succeed; and a major factor for its success was air superiority, the overwhelming application of air power – with all that that implies in terms of aircraft and their supporting equipment, planning and logistics: nothing was left to chance.

Logistics is the 'art of the moving and quartering of troops' and of 'supplying and maintaining a fleet'. In these days of air power those terms have to be transliterated and re-defined from their original Army/Naval connotations: the Second World War saw, from its start, air power as a major factor in any conflict between nations.

This has been a Michael Palin-type tour of the 1939-45 campaigns, beginning in France in 1939 and ending with the re-entry into that country in 1944; but I hope it has provided food for thought and discussion.

Logistics of the Second World War Land/Air Campaigns:

France, Sep 39	Inadequate base facilities
Norway, Apr–Jun 40	Climatic problems
East Africa, Jun 40–Nov41	Vast distances
Greece, Oct 40–Apr 41	Shortage of airfields, poor roads
Iraq, Apr–May 41	Established bases – Habbaniya etc
Syria, Jun–Jul 41	Railway line problems
Western Desert, 1941–43	Organised reinforced/supply lines
Singapore/Burma, 1941–45	Jungle, monsoons, mountains
Operation TORCH, Nov 42	Initial logistic problems; rain and mud
Operation HUSKY, Jul 43	Malta as an offensive base; Combined Command
Operation OVERLORD, Jun 44	Overwhelming logistic support
Operation ANVIL, Aug 44	Overwhelming force, negligible opposition.

[1] I am indebted for these details of the Norway campaign to the first volume, *The Fight at Odds*, of *Royal Air Force 1939-1945* by Denis Richards.

THE DECLINE OF MOBILITY: THE RAF AND DEPLOYED OPERATIONS SINCE 1945

Dr Sebastian Ritchie

By the end of the Second World War the Royal Air Force had developed an exceptionally advanced mobile capability. After six years of hostilities it possessed an unrivalled ability both to launch and sustain short-notice operations all over the world with the bare minimum of prepared base facilities.[1] By contrast, recent assessments of the RAF's mobility have drawn pessimistic conclusions. The Mobility and Deployed Support Study (MDSS), prepared in 1993, suggests that a significant decline in the RAF's capacity to conduct deployed operations has occurred in the post-war era.[2]

The essence of the MDSS was that, during the Cold War era, the RAF became critically dependent on well-prepared main operating bases (MOBs) and forward operating bases (FOBs). Neither its principal weapon, the Tornado, nor the Tornado's support organisation were well adapted to operations away from MOBs; over the years, specialised mobile Second Level Support Units (SLSUs) had lost much of their flexibility, and Britain no longer possessed the air transport capacity to deploy the RAF's potential reaction force contributions within the required timescales.[3] The Study examined the possibility of providing fly-away packs (packs of spare parts required to sustain deployed operations for a maximum of 30 days) for all aircraft types with a potential deployed role, but concluded that they would be too expensive. It therefore recommended the creation of smaller Priming Equipment Packs (PEPs) backed by accelerated resupply from the UK, so-called 'Express Chain Management'.[4]

There is no real debate on whether a decline in mobility has occurred, and it is not a criticism to infer that it has occurred: it is a statement of fact. However, the reasons for the decline of mobility are more open to question. The MDSS blamed the so-called 'Citadel' strategy of the 1980s, in other words, the processes involved were relatively short-term.[5] On the other hand, it may be that the current situation is the result of much longer-term developments. This paper provides a brief survey of the post-war years in an attempt to explain how, and why, mobility has declined. Very little research has, to date, been undertaken into this subject, and the results of this study must therefore be somewhat tentative.

It might at first be thought surprising that this survey should commence in 1945, for the requirements of imperial defence ensured that few armed services accumulated more experience of operations beyond the NATO area than the RAF in the three decades after 1945. In these years the Air Force was called on to fly in an exceptionally wide variety of theatres and operating environments, and this inevitably ensured the preservation of a degree of mobility far greater than exists today.

Yet such actions rarely conform to the current understanding of the term 'deployed operation' (as coined by the MDSS), which is generally used to describe an operation conducted away from well-prepared and designated air bases. Until the mid-1970s, the RAF could conduct out-of-area operations from a chain of extensive base facilities stretching from the Mediterranean to the Gulf, across the Indian Ocean and into the Far East. Officially, 'great importance' was 'attached to the mobility of the Force' and to 'reducing its dependence on a widespread and elaborate base organisation' after the Second World War.[6] In practice, the Air Force soon became reliant on such facilities, and all of the major out-of-area operations in which it participated between 1945 and 1965 depended on them: Singapore for the Malayan Emergency. Cyprus for the Suez operation, Aden and Bahrain for the Kuwait crisis, Singapore, again for the Indonesian Confrontation.[7]

This occurred for a variety of reasons. The multiplicity of scattered RAF stations which had accumulated during the War was extensively rationalised in the immediate post-war years, partly to cut costs; considerations of security also led to the consolidation of base facilities, as colonial nationalism grew in strength. Changing aircraft technology was another contributory factor: as aircraft development and production costs soared, stockpiling was increasingly favoured over air transport. Moreover, the growing technical sophistication of Service aircraft in the new jet era necessitated the provision of evermore elaborate maintenance and repair facilities overseas. Human considerations were no less important: in an era of dramatically improved living standards, the RAF had to develop extensive, comfortable and modern housing for Servicemen and their families at all the main colonial bases.[8]

Finally, of course, there were tactical changes. The exceptional degree of mobility acquired by the RAF during the Second World War grew out of specific operational circumstances: by the time the wartime logistics organisation had been perfected, British forces were primarily engaged in

fast-moving tactical support operations of an offensive nature.[9] Such operations did not persist after hostilities ceased. Instead, the requirements of imperial defence entailed a far more reactive and increasingly static posture, focused on the chain of overseas bases. In this environment, there was no need to maintain the levels of mobility which characterised the wartime years, and that capability was therefore significantly reduced.

More specific evidence of a decline in mobility is not difficult to find. One of the best illustrations is provided by the UK-based air transport force. Transport Command was created in the Second World War and was the backbone of the RAF's wartime logistical effort.[10] A substantial air transport force was retained in the immediate aftermath of hostilities, but only for such exceptional requirements as the post-war trooping and reorganisation of overseas forces, the reconstruction of Western Europe and the Berlin Airlift.[11] In the early 1950s it was drastically reduced: by mid-1957 the total resources available to Transport Command for a major peacetime emergency comprised only 20 Hastings, 10 Beverleys, 5 Comet 2s and 11 Valettas.[12]

The inadequacy of Britain's lift capability by the mid-1950s was graphically displayed during the Suez crisis.[13] However, this was by no means the only instance when out-of-area operations taxed to the limit the logistical capability of the RAF. During the Malayan Emergency, for example, many RAF squadrons experienced extremely low rates of serviceability: figures of between 35 and 55 per cent were common. Moreover, although the lowest rates were recorded by units operating new jet aircraft, for which spares were not yet available in sufficient quantity, considerable difficulties were also experienced by squadrons equipped with older piston-engined models for which spare parts existed in abundance.[14] It is therefore difficult to disagree with the official historian's conclusion that low serviceability rates reflected, at least in part, 'the logistical difficulty of reinforcing, re-equipping and providing an adequate spares backing for a command 6,000 miles from its source of supply.'[15]

By the late 1950s Britain's dependence on the overseas bases was being acknowledged at the highest levels of government: this acknowledgement was implicit in new policies designed to improve mobility after the Sandys' defence review in 1957. The renewed interest in mobility stemmed initially from proposals to reduce the scale of British forces overseas: it was envisaged that, in the event of an emergency, overseas bases would be rapidly reinforced from a Strategic Reserve in the UK. However, with

decolonisation gathering momentum, the government was soon forced to confront a more complex problem: Britain might have to launch overseas operations in theatres where political commitments had been retained, but where there were no prepared base facilities. For this purpose, specially designed mobile forces would be required:[16] In 1959 the new Minister of Defence, Harold Watkinson, told his Permanent Secretary that his top priority was to 'examine the possibility of providing for the utmost mobility of our forces'. Watkinson favoured the development of a new capability to move small but well-equipped forces quickly to points of crisis around the world.[17]

An early consequence of this new line of thinking was that the progressive decline of Transport Command was reversed. The 1957 Defence White Paper announced the government's intention significantly to raise the carrying capacity of the air transport fleet, and further increases were sanctioned in the early 1960s.[18] Carrying capacity multiplied nearly three-fold between 1955 and 1960.[19] In 1959 the Air Council decided to re-establish 38 Group, Transport Command, as a specialist tactical support group to control overseas operations. The group would be responsible for enhancing the mobility of British forces in deployments outside Europe.[20]

Among the mobile facilities for which 38 Group assumed responsibility were the Mobile Air Movements (MAMS) teams, first created in 1958. The teams were capable of deploying to any overseas theatre to reinforce existing movements organisations or to provide air movements facilities at bases where none existed. Initially there were only four MAMS teams, but as the transport force grew in size, so did the number of teams.[21] A range of new second level support units was also established by the group, such as the Tactical Communications Wing, which was to provide tactical communications facilities for air support operations, and mobile air traffic control.[22] Finally, 38 Group provided support for the ACE Mobile Force (AMF), a new organisation created at the end of the 1950s for rapid deployment to NATO's flanks.[23]

The objective of enhanced mobility was undoubtedly achieved: 38 Group played an active role in maintaining logistical support for major operations in both Kuwait and Borneo in the early 1960s, and for lesser actions in a variety of other theatres.[24] Yet it was achieved to fulfil a very specific operational contingency which proved short-lived. The defence review of 1967 announced Britain's withdrawal from territories east of Suez. It was initially accepted that Britain might retain residual political

commitments in some of these regions, along with the military capability to discharge them, but in 1968 this position was revised. Decolonisation was to be accelerated; political commitments outside Europe were to be reduced, and no specific provision for an extra-European military capability was to be made; out-of-area operations would now be conducted by formations normally assigned to NATO.[25]

A reduction of the RAF's out-of-area capability inevitably resulted from this strategic reorientation; yet this did not necessarily imply a reduction of mobility. For while Britain now relinquished many of her extra-European commitments, she threw her weight behind the new NATO doctrine of flexible response.[26] The specialist mobile reinforcement forces which had been developed since the Sandys defence review were reassigned to a new body, the United Kingdom Mobile Force (UKMF) which was primarily committed to NATO,[27] and the UKMF, together with the smaller AMF, now became the focus of RAF mobility. This dramatic change compelled the Air Force Board to re-examine the entire question of mobility and of how it should be achieved in the new strategic environment.

A new two-level system of support was devised. The first level was to enable front line squadrons to operate from any established base. Squadrons would be provided with the degree of engineering supply and administrative support necessary to enable them to operate away from their permanent stations. Personnel already established at parent bases would be earmarked for deployment with the squadrons, together with such items as ground support equipment and spares and test equipment for fly-away packs.[28]

The second level would provide the additional support needed to bring the facilities of non-established bases up to the standard necessary for effective operations. The administrative and specialised units needed to achieve this would largely come from existing Strike and Air Support Command resources. Some of these, such as the Tactical Communications Wing, were permanently established; others were to exist in shadow form and would not be activated until required for operations or exercises.[29] The principal example of a 'shadow' unit was the Tactical Supply Wing (TSW). Established at RAF Stafford between 1969 and 1971, the TSW provided a highly mobile supply service for units operating away from established airfield installations. It was based on a small permanent nucleus of staff which could be augmented by additional personnel from Stafford as the need arose.[30]

The new policy statement and the formation of the Tactical Supply Wing suggest that the RAF was still according a high priority to mobility at the beginning of the 1970s. There are, however, two reservations to be made. First, the new mobility policy was, of course, primarily designed to support deployments in the NATO area, and would therefore be critically influenced by the requirements of NATO strategy.[31] A mobile capability would be retained if NATO so desired; equally, if NATO acquired more rigid strategic doctrines, mobility might suffer. Second, only limited resources were provided to support the new policy: the formation of the TSW was, for example, extensively delayed because of arguments about the scale of its permanent establishment, which was in any case diminutive.[32] Moreover, at precisely the same time as the TSW was being formed, other specialised mobile units were being subjected to very significant economies.

This is hardly surprising. The withdrawal from the east of Suez was undertaken with the declared intention of reducing defence expenditure, and it was inevitable that some of the cuts should have fallen on the support organisation: the RAF lost approximately 8,000 support posts in the early 1970s.[33] But the axe fell quite specifically on the RAF's capability to mount deployed operations in non-European theatres; the capability which remained, although impressive, was entirely assigned to Europe and would therefore, once again, be shaped by NATO strategy in future.

An illustration is provided by the Tactical Communications Wing. In December 1971 the Vice-Chief of the Air Staff sought substantial reductions in the establishment of the TCW on the grounds that, 'although 38 Group still have a responsibility for some activities outside Europe . . . it is generally recognised that the possibility of our forces being used outside Europe is now much reduced.'[34] The subsequent deliberations reveal that other sections within 38 Group were basing their establishments on NATO requirements only, and that a considerable number of posts were being abolished as a result.[35]

The new focus on Europe reduced the RAF's ability to mount out-of-area deployments in other ways, too. Although, by 1960, the Air Force was already significantly less mobile than in 1945, Britain's overseas presence nevertheless helped her to sustain what was, by modern standards, an extremely flexible logistical capability. Overseas service provided the RAF with a formidable reserve of experience and expertise in a very wide range of operational environments and, in Sir David Lee's words, 'contributed to

the development of an air force capable of operating with distinction anywhere in the world.'[36] During the Kuwait crisis of 1961, for example, a proposal that the newly-formed 38 Group should assume in-theatre tactical air command was rejected on the grounds that RAF personnel already stationed in the Gulf would be better qualified to undertake this responsibility.[37] By contrast,

> *'Denial of such experience must be to the overall detriment of RAF adaptability in spite of every effort to make good the deficiency by means other than overseas service.'*[38]

Hence the strategic reorientation of the late 1960s and early 1970s affected the RAF in a somewhat contradictory manner. Within the NATO area mobility may well have been enhanced in the short term; but the Air Force's ability to mount deployed operations in extra-European theatres undoubtedly suffered.

By the mid-1970s the bulk of the RAF's operational capability was being focused on NATO requirements. Base facilities in Germany were being consolidated and developed, together with logistical arrangements that were highly efficient and effective, but ultimately suited to a relatively narrow range of military eventualities.[39] The Air Force's continuing commitment to mobility was represented by the AMF and the UKMF, now known as the 'Specialist Reinforcement Forces', 38 Group and associated mobile units such as the TSW, and by a transport force which still boasted 115 aircraft. Further policy changes now occurred, however, which reduced still further the Service's mobile capability.

At the end of 1974 a new defence review was initiated. This envisaged a further withdrawal from non-NATO commitments and certain changes in Britain's specialised reinforcement tasks. The AMF, to which the RAF made only a small contribution, was untouched. By contrast, the UKMF, with its much larger RAF contingent, was both redeployed and cut back. It was decided that the force would no longer deploy on NATO's southern flank, but would instead be confined to the Central and Northern area; in other words, it was to become less mobile.[40] This was not merely because it would now serve two regions instead of three, but also because the northern and central regions offered significantly more elaborate fixed installations than their southern counterpart.

At the same time, the land element of the UKMF was to be reduced from three air-portable brigades to a single air-portable formation. The reduction of this force, together with the withdrawal from non-NATO

commitments, enabled the government to cut the air transport fleet in half.[41]

Within NATO a review of the role of the Specialist Reinforcement Forces was also being conducted at this time. Doubts were expressed about the integration of air and land forces within the UKMF on the grounds that it placed limitations on SACEUR's ability to deploy his air assets, and it was therefore decided that the air element should be committed to SACEUR's Strategic Reserve (Air) (SSR(A)). The UKMF and the AMF were each left with one squadron of offensive support aircraft, while the SSR(A) was assigned four squadrons for both offensive support and reconnaissance.[42]

This was at first perceived as a step towards improved flexibility;[43] in time, however, the SSR(A) assumed a more rigid posture, having been integrated into SACEUR's Rapid Reinforcement Plan in the early 1980s.

The Rapid Reinforcement Plan involved a reduction in the number of national deployment options, and an increasing emphasis on so-called 'regional dedication': by the mid-1980s all the Specialist Reinforcement Force squadrons had been assigned to the northern region of NATO. The number of basing options for the SSR(A) and the air element of the AMF was reduced from 18 to 6. To accelerate reinforcement times and reduce air transport requirements, stockpiles were increased.[44]

By the mid-1980s, therefore, the Specialist Reinforcement Forces had been absorbed into an inherently immobile strategy which assigned them to a limited number of well-prepared bases in a single NATO region. Even after this, however, it is possible to identify one final development which tied the RAF still more firmly to main and forward operating bases in Europe: the introduction of the Tornado GR1.

While the RAF retained Jaguar squadrons in both the SSR(A) and Germany, a scenario could be envisaged in which a substantial offensive force was deployed beyond the NATO area using the support organisation of the Specialist Reinforcement Forces. No such contingency could be considered following the re-equipment of RAF Germany and partial re-equipment of the SSR(A) with the Tornado. For although the Tornado represented a considerable improvement over the Jaguar in almost every technological respect, it was far less suited to deployed operations; indeed, it was designed specifically for the European theatre.[45] It was never assigned a deployed role, and its support organisation 'primarily focused on the rapid generation of operationally critical equipment at well-found MOBs in transition to war.'[46] The two Tornado squadrons assigned to the

SSR(A) were to operate against enemy targets in Europe from their bases in the UK.[47] By the final years of the decade, the overwhelming preponderance of the RAF's strike/attack capability derived from this one aircraft.

Conclusion

In the story of the decline of mobility it is possible to identify four distinct phases. In the first, 1945 to 1956, the mobile capability developed in the wartime years was lost; the RAF became increasingly dependent on a network of well-prepared overseas bases, and made swingeing reductions in the air transport force. The second period, 1956 to 1967, witnessed an attempt to revive Air Force mobility through the expansion of the transport force and the creation of a range of specialist mobile combat and support units. However, the renewed interest in mobility stemmed from short-term strategic assumptions which were soon challenged.

In 1967 defence policy was reoriented towards Europe together with the specialist mobile forces and support units previously intended for overseas deployments. Nevertheless, a continuing commitment to mobility was reflected in the doctrine of flexible response, in the creation of new SLSUs like the TSW, and in the maintenance of the Specialist Reinforcement Forces. The levels of mobility which the RAF could attain thereafter depended on the role assigned to these forces by NATO strategy. In the final phase, between 1974 and the end of the Cold War, the Specialist Reinforcement Forces and their support organisations were committed to a narrow range of pre-planned NATO deployment options, and were optimised accordingly. The RAF's offensive capability came to rely almost entirely on the Tornado GR1, an aircraft in many ways unsuited to deployed operations.

None of this is particularly surprising. Given the strategic assumptions of the Cold War and the limited resources available, it was entirely logical, indeed sensible, that NATO should have received absolute priority over other defence commitments. The elaborately equipped main and forward operating bases, the hardened aircraft shelters, the carefully prepared dispersal sites and stockpiles, and the pre-assigned deployment plans were all eminently suited to the single, all-encompassing, military eventuality for which they were designed: a war between NATO and the Warsaw Pact in Europe.

By contrast, it seemed less important to maintain an expensive

capability to support deployed operations in overseas theatres where any threat was perceived to be minimal. Only the collapse of the Warsaw Pact and the subsequent outbreak of several localised conflicts outside the NATO area would provide any basis for challenging these assumptions. It is in this context that the current debate on RAF mobility must be understood.

Notes:

[1] Group Captain P J Dye, 'Logistics Lessons from the Past: Deployed Operations', *Air Clues,* September 1996, 351.

[2] DSpt Pol(RAF) (MDSS/718, 'Mobility and Deployed Support Study', July 1993.

[3] *Ibid*.

[4] *Ibid*.

[5] *Ibid*.

[6] Air Estimates 1948-49, 4.

[7] Air Chief Marshal Sir David Lee, *Eastward: A History of the Royal Air Force in the Far East, 1945-1972*, HMSO (London, 1984), 71-83; 183-189; Lee, *Wings in the Sun: A History of the Royal Air Force in the Mediterranean, 1945-1986.* HMSO (London, 1989), 53-60, 63-69; Lee, *Flight from the Middle East*, Air Historical Branch, Ministry of Defence (1978), 153-162, 171-177.

[8] Lee, *Eastward,* Ch 6, 7, 10 and 15; Lee, *Wings in the Sun,* Ch 1, 4, 9, 11; Lee, *Middle East,* Ch 1, 2, 5 and 8.

[9] Dye, 'Logistics Lessons', 349-51.

[10] Humphrey Wynn, *Forged in War: A History of Royal Air Force Transport Command, 1943-1967*, The Stationery Office (London, 1996), Ch 2.

[11] *Ibid*. Ch 7 and 9.

[12] *Ibid*. Ch 10; T C G James, *Defence Policy and the Royal Air Force, 1956-1953,* Air Historical Branch (1987), 67.

[13] Michael Dockrill, *British Defence since 1945,* Blackwell (Oxford, 1988), 60-61; Wynn, *Forged in War,* 84.

[14] *The Malayan Emergency, 1948-1960,* Ministry of Defence (1970), 31-32.

[15] *Ibid*.

[16] James, *Defence Policy,* 50, 166-68.

[17] *Ibid*., 189

[18] *Ibid*., 50, 191.

[19] *Statement on Air Estimates,* 1959-60.

[20] Wynn, *Forged in War,* 121, 126-28.

[21] Wing Commander J D Lambert, 'UKMAMS at Lyneham', *Air Clues* (September 1974), 452-55.

[22] AMSO file AF 47/1/1 Pt 1, Working Party Review of No 38 Group Tactical Communications Wing, by Air Support Command, February 1972.

[23] James, *Defence Policy,* 127, note 45.

[24] Lee, *Eastward*, 265; *Flight from the Middle East*, 178.
[25] Anthony S Bennell, *Defence Policy and the Royal Air Force, 1964-1970,* Air Historical Branch (1994), 12-12, 12-16.
[26] *Ibid*. 11-23, 11-25.
[27] VCAS file AF 303/4, Air Vice-Marshal LD Mayor, ACAS (Pol), to PS to VCAS, 30 April 1968, covering memorandum entitled 'Additional UK Contribution to NATO in the Short Term – Mobile Task Force'; AMSO file AF 47/1/1 Pt 1, Working Party Review of No 38 Group Tactical Communications Wing, by Air Support Command, February 1972; *Statement on Defence Estimates,* 1975.
[28] AFB (71)14, note by AMSO and VCAS for the Air Force Board, 'Mobility in the 70s', 26 May 1971; the note cites AFBSC (67)10, the basis of the concept of mobility for the Royal Air Force approved by the Air Force Board in 1967.
[29] *Ibid*.
[30] 'Have Everything – Will Travel: That's the Tactical Supply Wing', *Air Clues* (May 1975).
[31] AFB (71) 14, 'Mobility in the 70s'.
[32] Maintenance Command Operations Record Book, February 1970, minutes of SASO's meeting No 1/70, HQMC, 16 February 1970. 'The taking of formal establishment action in respect of the permanent staff awaits MOD agreement'.
[33] *Statement on Defence Estimates,* 1975.
[34] AMSO file AF 47/1/1 Pt 1, APS to VCAS to AMSO, 9 December 1971.
[35] AMSO file AF 47/1/1 Pt 1, Air Marshal Sir Harry Burton, AOC-in-C Support Command, to VCAS, 11 May 1972.
[36] Lee, *Flight from the Middle East,* 291-92.
[37] *Ibid*., 178.
[38] *Ibid*., 291-92.
[39] Lee, *The Royal Air Force in Germany, 1945-1978,* Air Historical Branch (1979).
[40] *Statement on Defence Estimates,* 1975
[41] *Ibid*.
[42] VCAS file 303/4 Pt 1, Air Vice-Marshal J A Gilbert, ACAS(Pol) to PS to VCAS, 12 March 1976.
[43] *Ibid*.
[44] CAS file 303/13 Pt 13, Report by the Directors of Defence Policy for the Chiefs of Staff Committee, 'Specialist Reinforcement Forces', 25 November 1980.
[45] Bennell, *Defence Policy,* 12-1, 12-4, 14-3, 14-6.
[46] MDSS.
[47] CAS file 303/13 Pt 13, Report by the Directors of Defence Policy for the Chiefs of Staff Committee, 'Specialist Reinforcement Forces', 25 November 1980.

DEPLOYED OPERATIONS IN THE COLD WAR

Group Captain David Packman

No sooner had I shown an interest in taking part in this seminar than I realised the soundness of the age old saying 'Never volunteer'. My mind was focused, not so much by the thought of standing in front of the distinguished audience we have here today, but rather by the realisation that, while I claimed to have some knowledge of the logistic support of deployed operations, my experiences were those of a junior – at times very junior – member of society. With that as a scene-setting comment I will merely say that what follows is based on work that I did as a 'Supplier' who had to try to make things work – frequently at times and in places not of my own choosing.

What I want to do is to say something about two very different methods of supporting deployed operations – each of which was valid in its own way and satisfied the needs of the day.

Firstly, I shall say something about the concept of operations and the supply support for V-Force aircraft operating away from main bases during the early 1960s when the 'tripwire' philosophy and 'massive retaliation' were the NATO watchwords. Secondly, I shall speak in some detail about the Tactical Supply Wing and its role in sustaining the Allied Command Europe Mobile Force and the United Kingdom Mobile Force in the time of 'flexible response' in the mid-1970s. In concentrating on the supply aspects I do not in any way wish to denigrate the importance or efforts of many other logistic agencies without which the front line can never function. I am merely limited myself to commenting on professional matters I once knew something about.

I arrived at RAF Wittering, fresh out of Cranwell, in December 1959 to be told that a large part of my duties would be directly related to supporting No 49 Squadron when some or all of its aircraft were operating from another base known as a 'dispersal' airfield. 'Forty-Nine' was one of seventeen V-bomber squadrons – six of which were Vulcan-equipped, four with Victors and seven with Valiants. These squadrons were the United Kingdom's strategic nuclear deterrent force. They formed part of Nos 1 and 3 Groups within Bomber Command.

The concept of dispersing flights of four aircraft at other bases was essentially one of increasing the chances of survival in the event of an attack on the United Kingdom by Warsaw Pact forces and preserving the

ability to strike back. This was the time when the aim was to get four aircraft on any particular airfield airborne in no more than the 4 minutes warning time of attack that, in some circumstances, was thought likely. In this context you may care to recall that, in the early days, there was no such thing as the simultaneous starting of four engines. It is interesting to note that a Squadron Leader Dixon, the engineering officer who designed the 'simstart' trolley with its massive array of batteries, was awarded the then princely sum of £1,000 by the Air Council Committee of Awards for Inventors.

Some idea of the geographical spread of the dispersals, all of which were in the United Kingdom, can be gained from this summary. They ranged from Lossiemouth in the north to St Mawgan in the south, and from Ballykelly in the west to Manston in the east. If a dispersal was within a 100 mile radius of the main base it was considered to be a 'near' dispersal; outside this circle it was termed a 'far' dispersal. When one had to deploy away from the main base, movement to near dispersals was by road, and by air to far ones. For airlift we relied mainly on Hastings and Beverleys.

There was a series of exercises designed to practice generating aircraft, dispersing, and familiarising air and ground crews in operating in unfamiliar surroundings. It included genuine no-notice dispersals one of which was not inappropriately known as MICKEY FINN. Notice or no-notice, I am bound to say that we never did arrive at one particular airfield without finding the local TV rental firm waiting for us at the dispersal gate!

V-bombers were demanding beasts which consumed large quantities of aviation fuel, a wide range of spares, and which required a lot of supporting ground equipment. They also needed long, strong runways, operational readiness platforms (ORP), comprehensive suites of radio and radar aids, and large scale domestic and technical accommodation for air and ground crew. This meant that dispersal airfields had to be well-found establishments, albeit not always RAF stations. For example, the two bases that at times most closely concerned me were RRE Pershore and the then Bristol Aircraft Company field at Filton. However, while there was certainly a large capital investment in providing extra aviation fuel storage installations and domestic accommodation, kitchens and the like, close to the dispersal airfield ORP, the ground equipment and spares in the shape of Fly Away Packs were deployed from the main base as was a full range of tradesmen ranging from cooks to radar fitters.

Each four-aircraft dispersal required the support of well over 100

ground tradesmen. While I now know there were financial constraints affecting the provision of dispersal real estate and personnel, I have to admit that, at the time, I was never aware of them. After all, I would remind you that the V-Force was the nation's strategic nuclear deterrent and the time I am talking about coincided with the Bay of Pigs incident.

Then, probably as now, there were difficulties in making the ground equipment go round. When in the throes of dispersing, there were often clashes between using a particular piece of kit to generate an aircraft at home base or making it safe for loading on a vehicle or an aircraft for move to the new airfield. More to the point from my position was the difficulty in preserving the contents of Fly Away Packs in a condition whereby the lids of the specially-designed, plywood containers could be immediately screwed down ready for movement. Items contained in Fly Away Packs were supposed to be sacrosanct and, while in store at main bases, could not be 'robbed' to help keep aircraft flying on a day-to-day basis. You can, I am sure, well-imagine the three-way battles that used to take place between flying squadron executives on the one hand, and engineers and suppliers on the others about just what could be appropriated, if only for a short period.

In those days, the emphasis for spares pack-ups was mainly on large assemblies with a preponderance of electronics equipment. In theory, they would have supported operations for up to one month away from the parent base. There certainly was little official scope for resupply or the return to workshops of unserviceable black boxes.

This was all well and good, but the concentration on major components at the expense of good old nuts and bolts and other more basic items meant that Crew Chiefs and other technical tradesmen travelled weighed down with these small but important essentials. I have to admit that the engineering tradesmen's ingenuity and ability, based on hard-won practical experience rather than on spares provisioning theory, often saved the day.

The situation I have described was inflexible, extremely expensive and, in some ways, lacking in imagination. Be that as it may, I am more than reasonably sure that, in the event of an attack by Warsaw Pact forces, it would have given us a chance of hitting back. It is also worth noting that the three types of aircraft concerned – Valiants, Vulcans and Victors – were designed using 1940s technology. At the time, only large aircraft dependent on long runways were able to carry conventional bombs or nuclear weapons. What is certain, is that the regularly rehearsed concept of working away from home with relatively tenuous logistics lines of communication

with main bases encouraged everyone on the ground to be flexible in their approach to on the spot problem solving. This also applied in no little measure to those out-of-area activities that from time to time came the way of the V-Force.

A good example of this occurred in July 1961. One flight of No 138 Squadron from RAF Wittering was enjoying its month-long SUNSPOT detachment at RAF Luqa in Malta when that year's Kuwait crisis broke and Operation SANDARIC was mounted. Overnight what had been a leisurely operating detachment of four Valiants grew to two full squadrons of eight aircraft each (No 7 Squadron flew out to Malta from Honington to join the remainder of No 138 Squadron). Fortunately, and due to the frequent and regular use of Luqa, there was a reasonable range of pre-stocked ground equipment. It was remarkable how, with the immediate prospect of some truly operational flying, this was shared out with good humour and how the Fly Away Packs did their job. I might add that 'good humour' was somewhat absent when the ground crew arrived from Wittering. Earlier on the day of deployment most of them had been on parade in front of Princess Margaret as the station was awarded the Freedom of the town of Stamford. Not only did they scarcely have time to change out of 'best blue' before deploying overseas but there were very few transport aircraft readily available for the Royal Air Force's own use and most of them flew to Malta in the back end of a fleet of Shackletons!

As Operation SANDARIC was a relatively open-ended commitment, there were good reasons for believing that Fly Away Pack equipment might not last the course. Resupply was, therefore, essential. The main difficulty in this respect was not so much one of getting serviceable replacements from the United Kingdom but of persuading the Luqa 'Movers' that highly specialist, unserviceable kit had to be returned to second and third line repair facilities in the United Kingdom without any delay – even if it did mean buying expensive air freight space on the daily summer tourist flights being operated by British European Airways.

So much for the days of massive, nuclear retaliation. During the next decade, NATO's military philosophy evolved and the policy of providing a graduated response to Warsaw Pact aggression was adopted. In many ways this meant a return to the days of greater operational and support flexibility for tactical warfare. In addition, by the end of the 1960s, the military helicopter had truly come into its own, with the attendant ability to operate from almost anywhere.

In the field of logistics, the policy pundits acknowledged that, due in part to the economic need for centralised facilities at home bases, front line squadrons were not likely to be self-contained when deployed off-base elsewhere within one or other of the NATO Commands. Accordingly, the idea of first and second level logistic support was introduced. First level backing, which included personnel, ground equipment and – would you believe – Tactical Fly Away Packs, was drawn from within each squadron or from its parent base while second level was provided by a number of new units. One of the first of these was the Tactical Supply Wing, or TSW as it was and is familiarly known, and I shall devote the remainder of my time to talking about this greatly-valued organisation.

As a second level support unit, the job of TSW and of other formations such as the Tactical Communications Wing, the Mobile Air Movements Squadron and the Mobile Catering Unit, was to bring facilities at non-established and bare bases up to the standard for effective operations by the Royal Air Force elements of the Allied Command Europe Mobile Force (Air), the Mobile Force (Land) and the United Kingdom Mobile Force. In the main, this meant catering for the needs of Wessex and Puma helicopters, Harriers and Jaguars. The prime operating areas were NATO's Northern and Southern Flanks, including: North Norway, BALTAP, Turkey, Greece and North-East Italy.

Contingency plans laid great emphasis on host nation support for the supply of aviation fuel and common-user ground equipment but it was recognised there would always be a lot of work to be done by the deploying forces. Within the overall scheme of things TSW was to be responsible for general supply support beyond first level and particularly for fuel supply forward of host nation storage facilities.

When TSW was established in 1970, economies were already starting to bite and it had to be accepted that there was insufficient manpower to permit the setting up of a permanently, fully-manned wing. So someone hit on the idea of locating it at No 16 Maintenance Unit, RAF Stafford, where there were already reasonable numbers of supply tradesmen, and of adopting a 'Cadre' and 'Non-Cadre' approach. By this I mean that approximately one third of the wing's total war establishment of some 200 men of a variety of trades worked on a full time, or cadre, basis while the remainder was drawn from Supply, Support and Engineering Wings at the Maintenance Unit for so many days, I think it was officially twenty each year, for training and deployment on exercises. These were the non-cadre

personnel. This was sound in theory but, as exercise and operational commitments grew, not least in respect of Northern Ireland and Belize, so did the burden on No 16 MU. Bearing in mind that the rest of the Royal Air Force's supply needs still had to be met, I feel more than a little surprised that, for much of 1976, the wing was allowed to take anything up to 1,000 man-days of effort per month from non cadre personnel of all ranks up to and including squadron leaders. I might add that there was never any shortage of volunteers for duties with TSW.

Another unique feature of TSW was its position in the Command and Control structure. Being based at Stafford it came under the command of Headquarters Maintenance Command which, in 1977, merged with Headquarters Training Command to form RAF Support Command. However, the wing was tasked for operations and exercises by Headquarters Strike Command. While an effective service was provided to the front line, it must be said that there were many protracted and bitter wrangles between the two Headquarters – usually with TSW caught fair and square in the crossfire – about what was a reasonable level of commitment. Nearly always the Strike Command view prevailed but I am sorry to say that, at times, there was much reluctance on the part of some middle-seniority officers to acknowledge the validity of each other's arguments. I fervently hope that this no longer applies. Perhaps Group Captain Robin Springett, who was a cadre member of TSW at the time of which I am speaking and who will be making his own presentation later this afternoon, will be able to reassure us on this point.

Part of the difficulty stemmed from the reluctance or inability of people to recognise that the 'tripwire' philosophy with aircraft operations being tied to a few large bases was a thing of the past. I do not believe the Royal Air Force, as a Service, did sufficient to educate all ranks, commissioned and non-commissioned, about the very significant change in philosophy and the need for total operational flexibility.

However, and returning to the supply aspects of logistic support, a singular success was the realisation by the Tactical Supply Wing that it made good sense to increase the effectiveness of aircraft by positioning fuel as close as possible to the area of operations rather than requiring aircraft to waste valuable flying time off-task going back to a more or less fixed base some distance from the front line. This was made possible by the use of pillow tanks and air portable fuel containers.

In the case of Harrier support, each pair of aircraft hides had its own

adjacent 1,000 gallon pillow tank and, from quite an early stage, properly-trained supply tradesmen undertook the refuelling. This, of itself, was a major departure from the traditional practice whereby only engineering tradesmen were allowed to do the job. It was a good example of a flexible approach which helped to speed up the turn-round of aircraft while, at the same time, keeping personnel numbers to a minimum.

With helicopters, aircraft time on task was significantly increased by the introduction of simultaneous rotors-turning refuelling of several aircraft drawing fuel from air portable fuel containers (APFCs for short) and using powered pumps rather than the antiquated method based on 45 gallon drums and hand-operated semi-rotary pumps. APFCs could be, and were, brought right up to the front line and, by avoiding having to shut down aircraft engines, refuelling time was reduced from up to 20 minutes per aircraft to well under five minutes. To this had to be added the savings in flying time by aircraft not having to transit many miles to a rear maintenance area or whatever. It must be significant that, once they had seen this system work for the Royal Air Force, the Army quickly became frequent and regular customers of TSW, as did the helicopter forces of all the other NATO nations, not least the Americans. As much as anything, the self-generated innovations trialled and introduced by TSW demonstrated how to maximise the inherent flexibility of air power.

Without going into detail, I must mention the fact that this type of support for helicopters quickly came of age during operations in Northern Ireland and in Belize.

If man can not live by bread alone it is true to say that aircraft need more than fuel to allow them to operate. This brings me briefly to the other TSW function – second level supply support. In many cases, wing personnel acted as the focal point for supply and other logistic support between flying squadrons and either the host nation or the Army. Within a year of the wing's being declared operational on 1 January 1971 a first class working relationship had been built up with the AMF(L) Logistic Support Battalion and with other units in the Army's logistic tail. This applied not only in the field but also in the more august surroundings of UK headquarters formations. There was close daily contact between the Headquarters of Strike and Air Support Commands, and Headquarters UK Land Forces at Wilton where the Colonel Q very quickly acquired his own RAF supply staff officer. Two incumbents of that post went on to command the Tactical Supply Wing – a really sensible bit of recycling.

This may seem old-hat today but in the early 1970s it represented a great advance and certainly laid the foundations for increasingly close inter-Service logistic co-operation in many operations and exercises at home and abroad during the years leading up to the Falklands War and, more recently, to the Gulf War and subsequent operations.

I could continue to talk about other aspects of the support of deployed operations during the Cold War period for a long time yet, but the time has come for me to draw together the threads of what I have been saying.

The post-World War II period was a difficult one. The speed at which technology developed was continually accelerating. This had the effect of generating new thoughts on how best to conduct military, and particularly air power, operations. In the days when the V-Force was the custodian of the national nuclear deterrent, most of the Royal Air Force's efforts were devoted to preserving the ability to mount a retaliatory strike against Russia. To do this there was a need to maximise the chances of survival for the weapons platforms. Hence the dispersal of aircraft away from main bases. The nature of the beast meant that there was relatively little flexibility and that well-found bases with extensive group support facilities had to be used. The only truly mobile support was manpower, ground equipment and fly away packs.

As new aircraft, notably the Harrier and more sophisticated helicopters, joined the front line the tactical flexibility of air power again came to the fore. This meant that total dependence on airfields became a thing of the past and some innovative thinking resulted in logistic support being taken to aircraft rather than vice-versa which had previously so often been the case. The more this was made possible by units such as the Tactical Supply Wing the greater was the force multiplier effect of truly mobile, flexibly-minded groundcrew of all ranks and specialisations.

Before handing over to Air Commodore Paul Crotty I want to leave you with two succinct statements of what I believe logistics is all about. The mottoes of the Tactical Supply Wing and the former RAF Support Command – 'Support to Strike' and *Ut Aquilae Volent,* translated – 'That Eagles May Fly'.

LOGISTICS SUPPORT IN THE GULF WAR

Air Commodore Paul Crotty

I was delighted to be invited to contribute to this very interesting seminar, but I must start with some health warnings. After a few years in the commercial aerospace industry with Lucas (where I am reminded constantly by my boss that we are at war every day) I must confess that the Gulf War now seems a very long time ago. What I have to say today is based entirely on my personal experiences and recollections as ACOS Logs at HQSTC during the Gulf War or Operation GRANBY as it was known in the UK (which I understand had some connection with a Pub near MOD's Main Building). Some of my opinions might sound a little critical and I am sure that many of the lessons I will draw out today have been overtaken by events since then. These lessons will clearly have a strong Supply and Movements flavour and will not necessarily line up with any official Logistics lessons from the war, which frankly I have never seen anyway.

Today I will first set the scene then discuss the major events under the broad headings of materiel, movements and personnel before identifying some of the major logistics lessons.

I would ask you to cast your minds back to August 1990. We were enjoying another long hot summer – on the international scene peace had broken out – a CFE agreement was on the horizon; the politicians were looking forward to reaping the peace dividend, and at STC we were actively debating the likely extent of our reorganisation resulting from Options for Change. Then, on 2 August, to everyone's surprise – even it seems to the intelligence community – Iraq invaded Kuwait. At that time Iraq had the fourth largest Army in the world and, with 700 fixed wing aircraft, the tenth largest airforce. The Iraqis had 24 very large MOBs which were heavily defended by 600 SAM units and 10,000 AAA. Some of their airfields were huge – Talil for example in south east Iraq covered 9,000 acres which is twice the size of London Heathrow. Back in 1990 (not surprising perhaps) virtually all our support arrangements were matched to the Central Region's concept of operations – and effectively we had both feet in NATO and not even half an eye on OOA. The PWHQ (Primary War HQ) at High Wycombe (which incidentally was only completed in 1989 after some five years in construction) was activated on 6 August, whereupon the Logistic Co-ordination Centre (LCC) immediately swung into 24-hour operations. On that Day One of GRANBY we had only a few

hours to assess the logistics implications of a number of possible 'what if' Gulf deployment options.

First, what aircraft were we deploying, because the Joint HQ (JHQ) favoured GR1s and Phantoms whilst MOD (presumably because of political pressure) favoured Jaguar and Tornado F3? What other aircraft and bases were contemplated? How long were we planning to support the force – was it a sprint or a marathon? What rates of effort would be applied – NATO stockpile planning guidance or something different? What facilities were available to us in theatre? Was there some host nation support resupply capability? Did we have any useful joint theatre plans or unit air staff tables on which to base our airlift planning? Did we have the right support equipment to fight a war in a desert which was 3,000 miles away by air and 6,300 miles away by sea? Well, as the hours ticked by on Day One it soon became clear that the answer to most of these questions was either 'no' or 'don't know', so the hot planning started. Just 48 hours after the deployment order was given Tornado F3s arrived at Dhahran and two hours later were on their first operational mission. Within a further 48 hours a Jaguar squadron, supported by VC10 tankers, was operational at Thumrait in Oman – early reminders of Air Power's reach, flexibility and speed of deployment. During the succeeding months we deployed additional aircraft to the Gulf as new bases were brought into use.

The RAF deployed to six operating bases: Tabuk, Dhahran, Muharraq, Riyadh and Seeb for Fixed Wing and Al Jubail and forward bases for Helos.

I think that will suffice by way of introduction and I will now turn to the supply and movements section of this talk.

Supply and Movements

Whatever the location, effective Logistics Support of deployed operations requires a number of essential ingredients, and you may care to see Rommel's list for his North African Campaign. Leaving fuel and weapons aside for the moment I will address this section on materiel by referring to these important (albeit rather unglamorous areas) – starting with Aircraft Supply Support. For Tornado, by far the largest of our deployed fleets, we held at the outset of Operation GRANBY just two fairly small tactical fly away packs (or FAPS) for the F3 in support of its SACLANT Forward Operating Base (FOB) option. There were no proper FAPs for the GR1 – just small peacetime training packs at Decci' and Goose Bay which we

quickly recovered. We soon realised that supporting the likes of exercises such as RED FLAG, Armament Practice Camps (APC's) Missile Practice Camps (MPC's) and TACEVALs was nothing like the intensive flying operations being conducted in the Gulf where aircraft flew between two and three times the normal UK and RAFG flying rates. Following our earlier experience of consumption patterns (and with help of the then CSDE) we set about building three large GR1 packs which necessitated a fair amount of asset stripping from both Strike Command and RAFG units, together with mutual supply support loans from the German and Italian Air Forces, production line stores robs from BAe, and some limited third line robs from aircraft undergoing majors at St Athan.

Our saving grace throughout was our extensive use of the BAe-operated second line avionic and mechanical component repair facility at Dhahran which increased from an initial 150 items per month to 800 per month once we deployed GR1s to Tabuk and Muharraq. We were also helped considerably by the phased deployment of our forces. This allowed us to progressively co-ordinate the equipment required for the extensive modification programmes which were completed before any of the deployment packages. Fortunately, our aircraft and system performance was excellent, with serviceability in theatre and recovery times far better than normal peacetime rates – prompted no doubt by sufficient ground crew manned to war establishments. The exceptionally good spares support again reinforced the value of centralised, command headquarters based, priority progression, and reflected the excellent response from industry, MUs and units. In turn good communications via ASMA (Air Space Management Aid) and USAS terminals installed at all Gulf units, together with prompt resupply, completed this success story. The only real spares problems occurred on equipment which was either rushed into service or where we had already acknowledged reliability and maintainability problems prior to the war on such systems as Sky Shadow and RHWR. Incidentally, the only environmental problems in theatre occurred on our SH Force through sand erosion problems on blades (especially Puma Tail Rotor) and rotor heads.

Staying with Equipment, we also discovered that much of our GSE (Ground Support Equipment) and role equipment was never designed with air portability in mind. Most Tornado Ground Equipment for example had been designed around fixed base HAS (Hardened Aircraft Shelter) operations with little regard for either its mobility or use on flight lines out-

of-area. Also much of our equipment was pre-stocked in Europe and required the urgent manufacture of STC's (Special To Contents Containers) for transportation, and we were particularly short of generator sets and weapon trolleys. Similarly, on the Nuclear Biological and Chemical (NBC) clothing fronts we were hard pressed. The NATO scale of four sets of NBC IPE (Individual Protective Equipment) was increased to six for the Gulf and portable collective protection – Colpro – (in the form of Winterbourne and Porton Liners), was in short supply, again because of our reliance on hardened facilities in the European theatre.

On the clothing side, we had no stocks of desert DPM and our stocks of tropical DPM and desert boots were soon exhausted. Urgent orders were placed in Morocco and Turkey for desert DPM but, with priority going to front line ground forces, it took several months before stocks reached RAF units. Predictably, there were shortfalls across the whole range of tactical field equipment needed to sustain our forces in the desert environment – from tents to water containers and from desert camouflage nets to kit bags – and we were fortunate indeed that we had time to rectify most of these deficiencies before the outbreak of war. In short, on the equipment front we had concentrated almost exclusively on fixed base operations and virtually ignored the possibility of a large-scale out-of-area operation. Clearly we discovered that the support of out-of-area operations required additional investment in sufficient, appropriate and good quality mobility equipment to sustain the widest possible range of deployment options.

Fuel

Turning now to the vital commodity of fuel, the problems we faced here graphically illustrate the difficulties encountered across the entire host nation support front in Saudi Arabia. Sadly our Arab allies at most levels were generally uncooperative, highly bureaucratic and most reluctant either to release authoritative information or to offer facilities. Hence, especially in the early days, we lacked reliable logistic planning data and because of political sensitivities we were denied the opportunity of conducting a meaningful early logistic recce. But, as our databank on the various deployment locations increased, we soon realised that the provision of fuel at most locations was problematic with tenuous resupply, unprotected facilities, dubious contingency plans and potentially unreliable Asian, Eurasian and Filipino labour. For example, at Muharraq there was just the one 16-inch pipeline into an airfield hydrant system and a single dispense

point. At Tabuk we were entirely dependent on road resupply from Yanbu on the Red Sea some 800 kilometres away and we relied on fifty contractor's bowsers each doing a 34-hour round trip to the port and back. We tried to obtain the use of a completed new port called Duba which was only 120 kilometres from Tabuk, but apparently it had not been formally commissioned by the Saudi authorities. To add to our concerns we were unable to establish a co-ordinated fuel off-take plan between ourselves, the Royal Saudi AF and the USAF at most of our deployment locations. We therefore worked towards giving ourselves five days of dedicated RAF fuel supply and this was only achieved by deploying our entire stocks of EBFIs (Emergency Bulk Fuel Installations), borrowing heavily from the Army and placing urgent orders on industry for more pillow tanks.

Altogether we required 130-odd pillow tanks split between five locations, almost three times the number earmarked for RAF use in TTW (Transition To War). Moreover, without the expertise of TSW (Tactical Supply Wing) none of this would have been possible anyway, and before leaving the subject of fuel, the quite unique contribution of TSW in support of the SH Force and land battle deserves special mention – Group Captain Springett incidentally was OC TSW during the entire operational episode. Following their initial deployment to Jubail on 7 October it soon became clear that TSW support of the rapidly expanding SH Force would be a major task. Some 250 TSW and support personnel including supply, movements, MT, catering, Gen Tech and armament tradesmen were deployed to support the eventual SH Force of nearly 100 Chinook, Puma, Lynx, Gazelle and Sea King helicopters of all three Services, and to provide refuelling facilities for a wide range of allied helicopters. Indeed TSW were the first RAF personnel to pass through the so-called 'breach' in the Saudi-Iraqi border and they continued to operate well forward to meet the demands of the SH Force, and established a total of 21 refuelling sites over a two-month period. TSW support of rapidly advancing forces on such a large scale had never been envisaged in a European context, but the success of their operations in the Gulf is a tribute to the training, flexibility and ingenuity of the TSW team and their supporting personnel. Moreover, their operations so close to the front line proved yet again that field and ground defence training are essential skills for staffs in key support roles.

To close this section on fuel we should recognise that the combined RAF/Army requirement for tactical fuel kits and bowsers overstressed the system. It was quite clear that for major out-of-area operations we needed

to enhance our fuel support systems, especially if operating from bare bases.

Weapons

I would now like to turn to weapons. On the conventional weapons front, here again there was much host nation bureaucracy to overcome before we gained approval to use or extend existing explosive storage areas to accommodate the number of weapons involved. By early January, the UK and RAFG weapons cupboards were fairly bare – for example, 80% of our 1,000 lb bombs and 65% of our JP233s were deployed to the Gulf. This outload represented a major sustained effort for 11 MU and the many units in UK and RAF Germany who prepared and transported weapons to ports and airheads, often at short notice and over long distances, by both road and rail. Fortunately, the outload exceeded the strict interpretation of the CDS stockpile planning directive – indeed with the bonus of Cyprus stocks inserted earlier as a buffer, we exceeded the 30 day directive by up to 40% in some natures. I say fortunately, because within one week of the outbreak of hostilities, we had a further three munitions ships heading for the Gulf, carrying mainly 1,000 lb bombs and ancillaries which we were using at a much greater rate than ever predicted by the operators.

With tactics evolving constantly in the early days of the campaign – particularly following the realisation that the Iraqi Air Force was not prepared to join battle – this prompted a switch from the use of JP233 (to hit enemy airfields) to the much greater use of 1,000 lb bombs to attack a wider range of targets. Providing the right mix of ancillaries to meet the requirements of these changing tactics proved to be a major headache for our weapons co-ordination cell. Fortunately, the Joint Commander's directive to move away from medium level free fall dumb bombing to ussing laser designation as the prime method of delivery halted the high consumption rate of 1,000 lb bombs which early on exceeded 400 on some days. This was the equivalent of fifteen full C-130 loads. This, in turn, prompted urgent procurement of LGB kits, requiring collection from as far afield as Western Australia to keep the supply pump primed.

Operation GRANBY demonstrated a number of things on the weapons front. Firstly the impressive results from PGMs (Precision Guided Munitions) certainly strengthened the view that quality is more important than quantity, especially against reinforced concrete structures. Secondly, there is a need for greater flexibility in our weapons stockpiling to meet the

widest possible range of tactical options, simply because industry cannot surge quickly enough to produce sophisticated munitions. As an example, during Operation GRANBY for the comparatively simple 1,000 lb bomb, maximum daily output (even when we had stocks of empty casings) was only 25 per day. As it was, our stockpile planning guidance, which was predicated on fighting a defensive war in North-West Europe, had produced only enough iron bombs to sustain operations for the equivalent of four GR1 squadrons for 65 days. Moreover, we need all-up multi-function weapons to enhance our flexibility and ensure that weapons usage is not constrained by shortages of key ancillaries. Finally on weapons, we soon realised that to answer the countless 'what if' questions on sustainability we needed a sophisticated model to replace our manually cranked spreadsheets. So we called in DLogEst's modellers to produce a weapon usage model – this was nearing fruition as the war ended.

Movements

Turning now to the second of my 3 major themes – movements. I must say the entire Air Transport (AT) Force and the movements personnel at each link of the Operation GRANBY chain did a fine job, despite enormous handicaps such as inadequate numbers of large cargo lift aircraft, obsolescent air cargo handing equipment (ACHE), insufficient role equipment, major infrastructure inadequacies and a shortage of suitably qualified manpower. What may not be fully appreciated is the sheer scale of the Operation GRANBY airlift. Over 45,000 passengers and 46,000 tonnes of freight were moved. At Brize Norton, for example, the Movements Squadron cargo throughput increased tenfold compared with pre-Operation GRANBY levels. Whilst the earlier RAF squadron deployments had in themselves been significant, the Army deployment alone exceeded even the Berlin Airlift of 1948, and stretched both Lyneham and Brize Norton to breaking point.

Following a small increase of on-hand freight during late December to about 400 tons, it had reached 500 tons by 8 January, doubled within another week and eventually peaked at 1,600 tons by 23 January, despite the daily airlift which exceeded 500 tons. This daily airlift figure just happened to be the same as the pre-war monthly figure for the entire RAF hand freight under cover, and indeed because 80% of the freight deluge came from Army sources, we decided to relieve the pressure at both Lyneham and Brize Norton by setting-up a 15-man pallet building team at

COD Bicester. These Bicester pallets were then exported directly to civil charter aircraft operating out of East Midlands, Gatwick, Stansted and London Heathrow where we were operating 707s, 737s, 747s, DC-10s, Super Guppies (and, frankly, anything we could get our hands on) from companies ranging from Cathay Pacific to the Romanian airline Tarom. To ease the pressure on our real estate at Brize Norton we erected two Rubb Hangars, and reviewed what else could be implemented quickly to improve our cargo handling.

Bids placed throughout the late ‘80s for new air cargo mechanised pallet handling and storage systems, costing about £2.5 million each at Brize Norton and Lyneham, had fallen victim at the LTC scrutiny stage. These LTC bids were resurrected, and even with the full endorsement of the Joint Commander and support in MOD, we failed to attract the necessary funding at the time. Fortunately as Director of Movements I was able to play a small personal part in putting this right after the war. Out in the Gulf the movements staff were also feeling the strain because we had effectively established cargo handling sections at eight airfields in theatre. Most freight was flown into Dhahran, Jubail or Riyadh where a hub and spoke system, operated by theatre-based Hercules, transferred freight to other key airheads.

Almost everywhere the quantity, quality and serviceability of our air cargo handling equipment was inadequate, and we were dependent on the goodwill of US Forces and in some cases hire arrangements in-theatre. For example, there were insufficient MBTLs (Main Base Transfer Loaders) for use with TriStar and our twety-five obsolescent Condecs went unserviceable frequently and often endangered the success of the operational airlift. Fortunately, by December Whitehall (Director Transport Movements & Petroleum) staff had hired some replacement handling equipment in the UK, which allowed us to transfer more Condecs and MBTLs into theatre. Incidentally we also used New Zealand, Spanish, Belgian and Kuwaiti C-130s, our old Belfasts (now with a company called HeavyLift) and USAF C-5s to ease the pressure on our own AT fleet. Finally, in terms of general handling equipment we also became critically short of aircraft pallets and nets. Fortunately the USAF came to our assistance with nets, and, when we also ran out of restraining chains, the Army at COD Bicester came to the rescue.

Lest I leave you with the impression that we relied exclusively on airlift, sealift was used extensively, especially for the Army deployments. For the

7th Armoured Brigade move alone we needed 46 ships (including 20 RORO vessels) operating under various flags ranging from British to Panamanian. With an average sailing time of 23 days to the Gulf this meant that as the first ships were arriving in theatre the last were still being loaded. For the four-brigade deployment we needed a further 54 ships so the total Army deployment (including some early resupply) amounted to 121 ships to move their vehicles and freight. On the RAF side we also used ships for much of our weapon outload, with the exception of JP233. At the height of the deployment there were 50 vessels either loading or en route to the Gulf from 20 different nations.

One final point on the movements front concerns the tracking of mission critical and battle decisive equipment in transit to the Gulf. With eight or so cargo destinations in theatre, and the huge volume of Army freight, we first resorted to colour-coding by destination. We also established critical item tracking cells at Lyneham, Brize Norton and in theatre, and in parallel to this action (which was very manpower intensive), we sponsored a study by the Cranfield Centre of Transport Studies into an item tracking system which essentially used well proven supermarket bar coding technology. Unfortunately this project also fell foul of the financiers. For movements, and in most other areas of Logistics Support, there was one overwhelming lesson: we must plan and equip for the peaks of war and not the troughs of day-to-day peacetime operations.

As an aside it is interesting to note that each ton of freight moved to the Gulf cost £300 by sea and £3,000 by air.

Manpower

My final theme is manpower and it goes without saying that any operation needs the right number of well trained, qualified and equipped personnel who know what they are all about. In the early days of the operation we were reminded of the vital importance of specialist mobility units such as TSW (Tactical Supply Wing), already mentioned, TCW (Tactical Comms Wing), UKMAMS (UK Mobile Air Movements), and MCSU (Mobile Catering Support Unit). These units alone, together with unit MSFs (Mobility Supply Flights), were practised and ready for bare-base operations and immediately available for rapid deployment. TSW, apart from their fuels responsibilities which I have already addressed, were the Mr Fixits for the first wave deployments and organised accommodation, hired vehicles and used LPOs to buy everything from

refrigerators for Combo pens to fresh food, as well as carrying out the tasks of airhead clearance, supply co-ordination and FAP maintenance. After the initial deployments, a Gulf emergency manning aid (or GEMA) was compiled detailing the manpower requirement at each base, across all trades, indicating whether the manpower was to be provided from a formed unit or the RAF at large. To keep deployed numbers as low as possible we sought manpower with multiple trade qualifications. Again deployed and mobile operations highlighted the need for a high proportion of our tradesmen to be qualified as drivers, particularly of HGV and MHE. Forklift truck drivers were in great demand at all points in the materiel handling chain, and we were surprised to discover that PMC did not maintain records of individuals able to drive FLTs.

Providing supply manpower was overall a containable problem, but the same was not true for the much smaller movements trade group which at the outset of the operation had only 88% of its 890-odd establishment. Moreover, with such a small trade group, over half of the personnel were already located at Brize Norton, Lyneham, UK and Akrotiri, the very units hit hardest by GRANBY. Despite using many MOV reforce suppliers, there was simply insufficient trained manpower available. However, after early Ministerial reluctance we eventually received authority in early January to call out the Royal Auxiliary Air Movements Squadron, which made all the difference, (although we were not authorised to deploy them beyond Cyprus until the war was over). Unfortunately civilianisation and contractorisation had effectively removed the manpower buffer we used to enjoy in pre-contractorisation days. Put simply, key support personnel are inseparable from the ultimate operational mission, and I have no doubt that an extended campaign would have stretched our resources beyond breaking point.

Lessons

I am sure that most of the lessons learned in 1990 have by now been at least recognised, even if not put right. To the points which have already emerged from my talk others could be added, including the value of Cyprus as a forward mounting base for any OOA operations in the Middle Eastern theatre, and the importance of our industrial base.

Conclusion

To conclude you will have gathered that on 6 August 1990 we were not too well prepared to support an OOA operation of the scale and intensity of

Operation GRANBY – especially in desert conditions. Predictably the operation exposed many of our manpower and equipment shortcomings, and without certain critical host nation support and help from our US colleagues we would have been hard pressed to support our forces, especially early on. We should also remember that we deployed our forces in convenient logistics phases, the supply chain was unmolested and there was little Iraqi action against our aircraft or bases. Nevertheless Op GRANBY again underlined the vital role of logistics as the engine room for the projection of military power. Winston Churchill, of course, had recognised this fact 45 years earlier. I have no doubt that, despite the many challenges, Operation GRANBY was an outstanding logistics success, and a great tribute to the resourcefulness of our servicemen (and many of their civilian equivalents) and their tremendous commitment to a cause which frankly did not match the liberation of the Falklands in patriotic appeal.

LOGISTICS IN THE POST COLD WAR ERA

Group Captain Robin Springett

The Royal Air Force has once again become a campaigning air force, and in my short presentation, I shall take you from one of our Main Operating Bases (MOBs) of the 1980s to a Deployed Operating Base (DOB) of the 21st Century somewhere in the middle east.

The Gulf War was a watershed for the RAF. We had shown that we could effectively project air power, but the cost had been exorbitant:

- We had taken too much equipment.
- We had not used it at all well.
- We had lost far too much.

One spin off was the Mobility and Deployed Support Study (MDSS) led by AVM Saunders, which sought to give mobility to all our aircraft, but first and foremost to the Tornado Force. This had to be achieved with due economy and quickly. The results of the study were far reaching, and underpin much of our current thinking.

The task was to deliver readiness and deployment to our forces being committed to the emerging NATO Reaction Forces doctrine, the Immediate Reaction Force (IRF) and Rapid Reaction Force (RRF). The work was adopted by HQ STC and adapted to work with the PJHQ and the requirement to interface with a single supporting command from each Service.

The Gulf War also spawned the concept of the Joint Rapid Deployment Force (JRDF), but the principles established for NATO Reaction Forces held good. So what are they?

MDSS introduced the concept of Host Nation Support (HNS) in a structured way to enable us to minimise airlift, take only what is necessary, reduce the need for stockpiles and spend only when needed. To assist in planning and readiness, we have introduced or, in cases reworked, the Logistics concepts. The key ones are:

- Modules.
- Express Chain Management (XCM).
- Second Level Support Units (SLSU).

- Logistics Command Control and reporting.

Taking each in turn. To date we have constructed over 600 Modules of equipment and/or manpower at MOBs and elsewhere; this enables us to tailor the build-up and support provided at a DOB to meet the operational situation and make best use of what is to be deployed or found at the base in the way of HNS. Specific MOBs can be protected by drawing modules from elsewhere. If you know what you want to deploy, you can control its deployment, and even adjust the deployment or mounting to meet changing priorities. If you know what has been deployed you have a good chance of accounting for it. Finally, uniformed manpower has to be used sparingly. The draw down post the Gulf War as a result of DCS has virtually halved the size of the RAF, with no reduction in commitments or tasks (*Figure 1*). Hopefully, you will see why we have had to get smarter!

Moving on to Second Level Support (*Figure 2*), which is a concept familiar to many, that has been expanded and developed to meet the changing needs. Familiar names are retained such as TSW, TCW, UKMAMS, MCSU etc. Others, such as TAS, TMW and RE Support are new. A few are full time, and TCW and UKMAMS spring to mind; others are cadreised to a lesser or greater extent, such as TSW and MCSU; others are fully cadreised and filled by modules as required, and here I am thinking of aircraft engineering, DOB supply and administration. This is another simplistic slide to illustrate how the Deployable Supply Group would be built up at a DOB operating Tornado GR1 and F3.

Port and airhead clearance teams could be drawn from TSW, material management from an F3 and GR1 base, with supply control initially from the latter. As the force builds, additional modules would be drawn in, and I am illustrating (*Figure 3*) a second supply control module from Leuchars, POL modules from Marham and Brize Norton. This kiddies jigsaw puzzle illustrates some of the components of XCM, but the time constraint means that I shall ignore the considerable amount of work in the UK base by Support Authorities and others to turn XCM from a concept to a capability.

To illustrate our change in thinking, this slide (*Figure 4*) shows how much we would have had to spend to provide twelve Tornado GR1S with a FAP, compared with the cost of a PEP supported by XCM as recommended by MDSS. Also, converting an existing FAP into a PEP releases repairables into the supply system. Deployable maintenance is not a new concept, and Marshall cabins will be familiar to many here; what is new, however, is the

concentration on support for battle decisive equipment, or systems with known reliability problems. DMFs as they are known, can be deployed as the situation develops in theatre. As an illustration, by deploying a simple filter bench to a current operation, we cut the 'no fault found' on returned LRUs by 60%, saving valuable airlift, and spares required to populate the repair loop.

The unit supply accounting system, USAS, which was designed to operate in the hardened environment has been expanded and given a stand-alone processing capability and, with the trend towards minituarisation of components, can now be deployed to a DOB in two boxes the size of a domestic fridge. No doubt, this size will reduce in future. It is a powerful tool, and asset tracking will soon be added, which is essential for the management of key repairables. We have seven DUSAS sets, with two deployed on current operations. ACDS(L) has identified DUSAS and the Army VITAL asset tracking as the benchmarks for in-theatre accounting. The foregoing is predicated on a robust logistics C2 and reporting system. Logs C2 is complementary to the Air Staff control over the force; it is one essential element in the estimate process which enables the AOCinC to discharge his responsibilities as a Supporting Commander, to deliver to the Joint Commander the weapon systems, the trained personnel and sustainability of the air element. I shall canter you through the process.

A requirement originates in the MoD (*Figure 5*); is communicated to the PJHQ, which forms a Contingency Planning Team (CPT) and gets into dialogue with Land, Fleet and Strike. Within the Strike Command Operations Centre (STCOC) Air Cdre Ops will call a Contingency Action Group (CAG) (*Figure 6*)at which all the disciplines are represented. A4 is logistics, and the function is discharged by the Logistics Support Centre of LSC. Commanded on a day-to-day basis by a Sqn Ldr Engineer, it can be geared up to one-star or ACOS level quickly, using the HQ and other logistics or specialist staffs in what is termed the Rear Echelon Support Team role. By this means, the appropriate intellectual weight of the staffs can be focused on the contingency, and the logistics support tailored to meet the operational output, and make best use of the facilities available.

The process is shown schematically here (*Figure 7*). The requirement comes into CAG from the PJHQ. The CAG/LSC process results in taskers to the RESTs and, hopefully, in-theatre recce, which is essential if we are to identify what the host nation will provide. Only by so doing can we really produce savings in the movement bill, for example by identifying vehicles

and technical accommodation available. The feedback into the CAG/LSC results in an offer to the PJHQ, which if accepted will lead to the LSC tasking the mounting process.

Of course, it is an iterative process, and can be used to make changes right up to the point of movement. The sustainment will follow much the same process. Clearly, sophisticated IT allows us to match the logistic support closely to the operational output required.

Finally, our DOB of the 21st Century should be made up like this (*Figure 8*), if we have all got our sums right. Moving round clockwise from the top left:

- Best use of HNS
- Robust comms and resupply.
- Initial and follow-on weapons to do the job.
- Fuel from an assured source.
- RE engineer support to bed-down and STO.
- Deployable maintenance as appropriate.
- Base support: medical, catering, supply and admin.

That concludes my presentation.

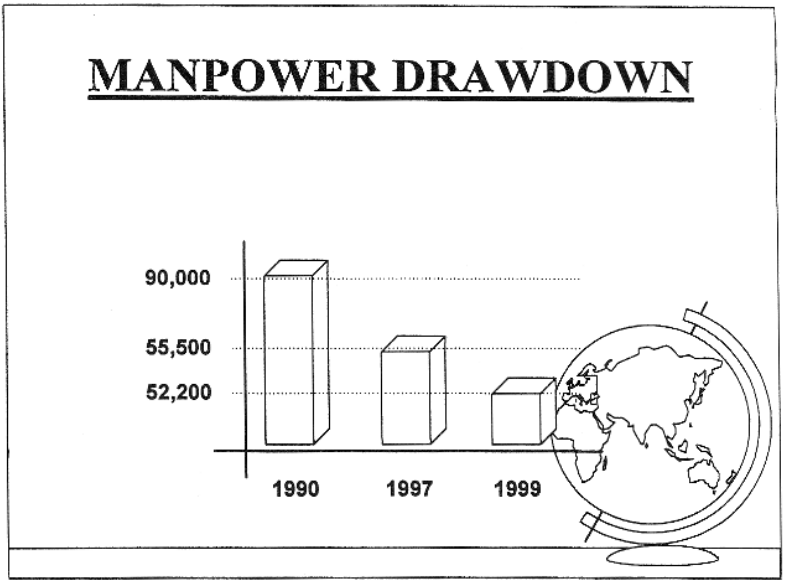


Figure 1

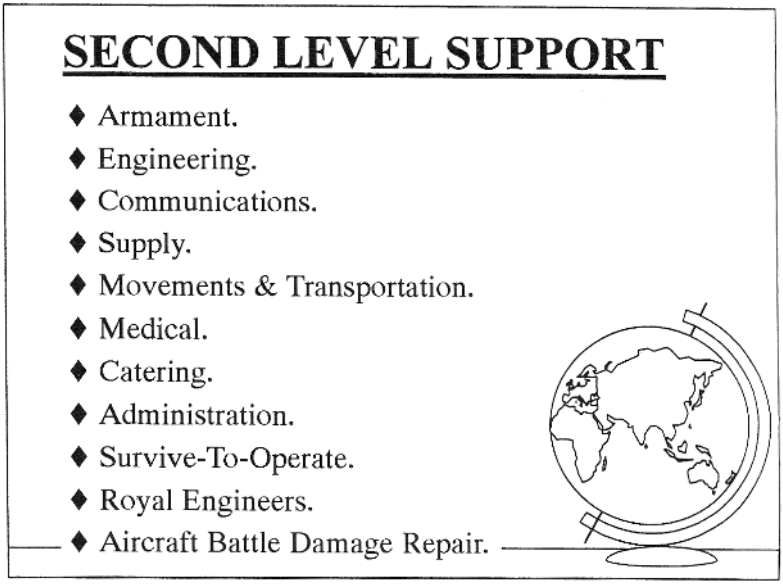


Figure 2

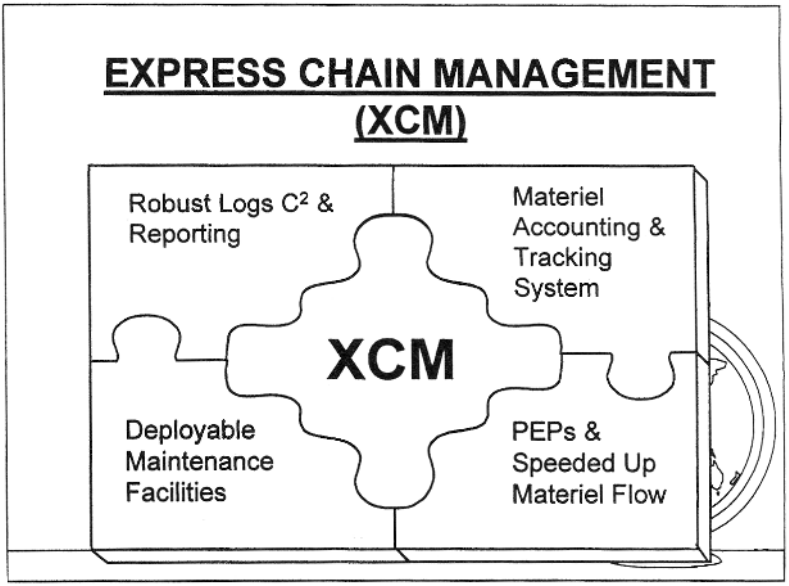


Figure 3

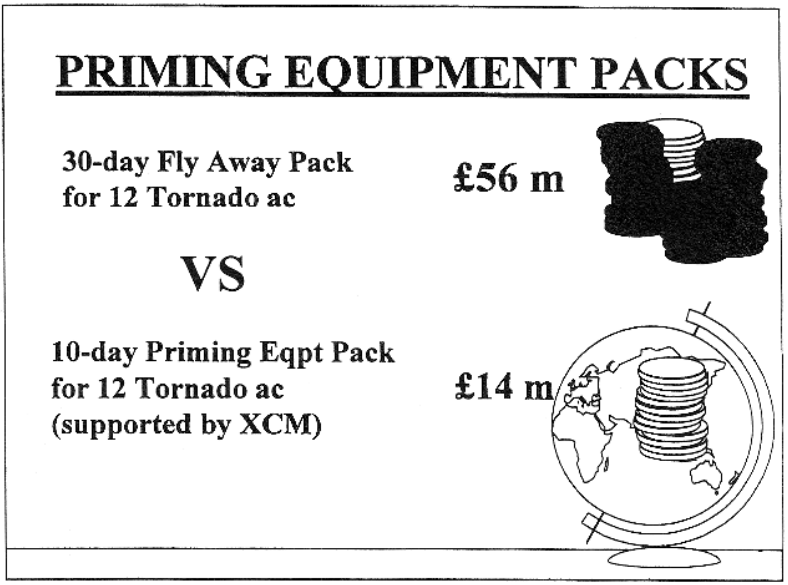


Figure 4

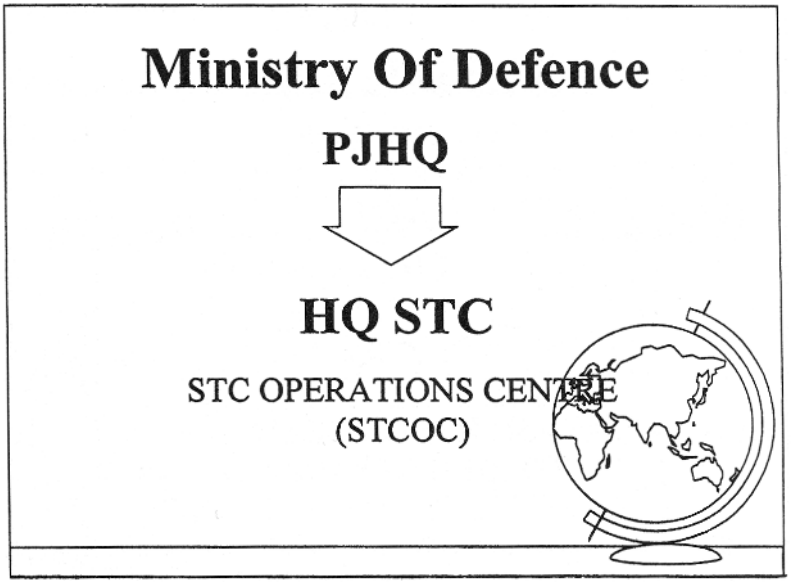


Figure 5

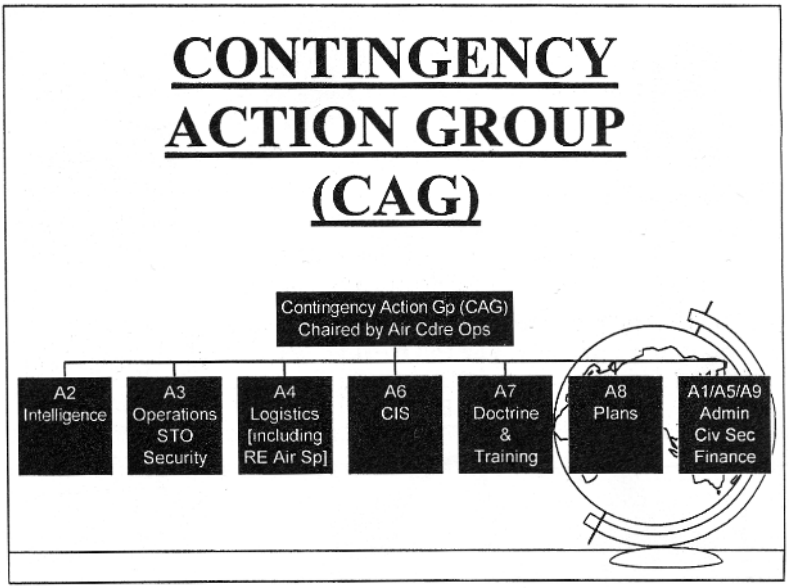


Figure 6

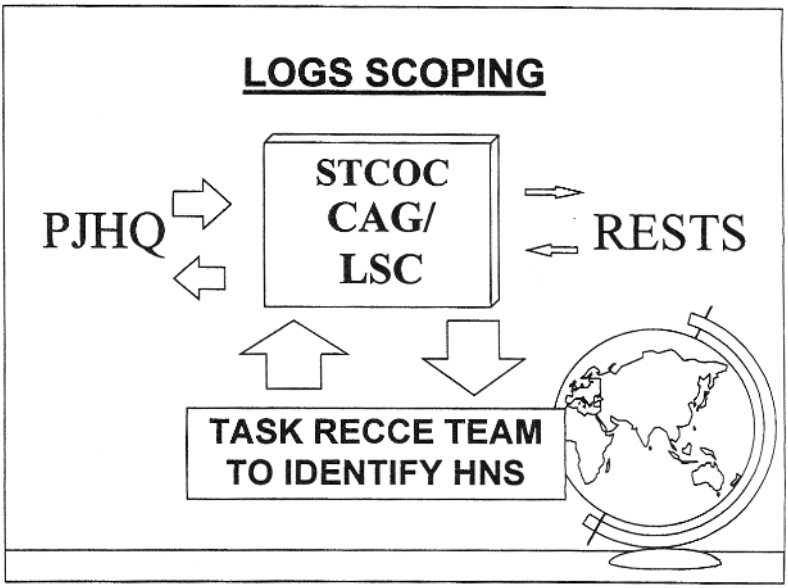


Figure 7

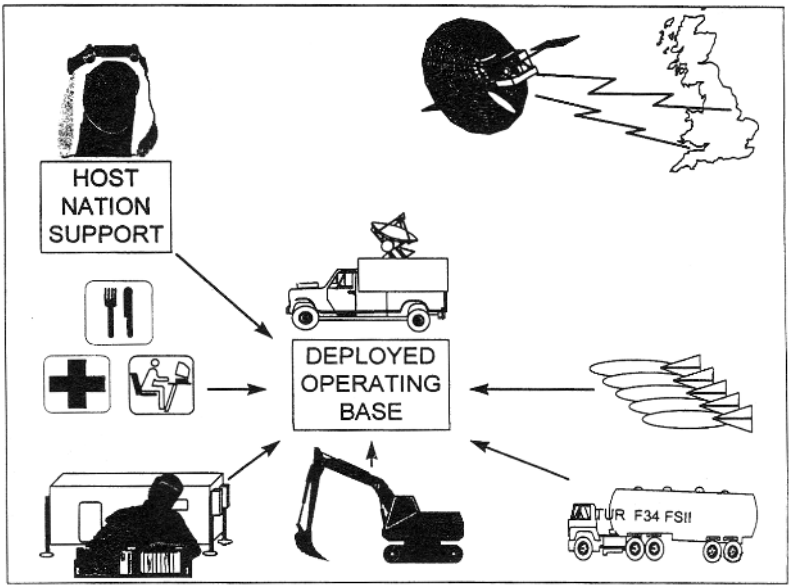


Figure 8

DISCUSSION DIGEST

Was there any standardisation in engine design during WWI?

There was an ongoing debate on overall standardisation of equipment during the war although this was never achieved. Designers worked at the limits of their creative and engineering imaginations. The scarcity of resources lead to pressure to use less exotic materials but even lessons learnt from one design using fewer bearings was not transferred to other manufacturers. A final point was made that during the inter-war period, much work was done to design military equipment to a standard tool kit; however, when war broke out, these standard kits were in short supply!

Was there any drive to achieve better Air/Land Co-operation during the East Africa Campaign?

No information on the East Africa campaign was available, however, during the summer of 1943, Exercise SPARTAN involved Air Force units moving rapidly across southern England moving from one Army-prepared strip to another to improve the co-operation between Army and Air Force units in preparation for OVERLORD.

Discussion then moved onto TIGER Force which was planned for autumn 1945 but was never fully activated because of VJ-Day. However, in preparation for the bomber support of the land invasion of Japan, Nos 9 and 617 Sqns deployed to the Far East and were due to be based at Okinawa. Two major convoys were dispatched in support carrying airfield construction and support personnel and these convoys ended up in Singapore and Hong Kong at the end of the war.

Considering that both the Axis and Allied forces faced the same environmental challenges, was it a surprise that anyone won anything?

In the North African campaign, victory was won or lost on the strategy employed to control the strategic limitation of fuel for aircraft and land vehicles. Ultimately, it was a loss of guaranteed fuel supplies that defeated the German forces. Although the *Luftwaffe* faced similar problems in term of geography and environment, considering the lead time available for going to war, they should have been better prepared.

In 1919, the British Government had declared that there would be no other war like the Great War again and this tainted defence policy and military thinking for the post WW I generation. Japanese and German military thinking was very different. The Chairman interjected that the

former East German Air Force maintained many of these pre WW II ideas. He recently visited an underground supply depot which maintained (during the Cold War) three year's supply of ammunition! This underground facility, built into a granite cliff, had been a strategic ball-bearing factory during WW II and had remained at full production, despite the best endeavours of the Bomber Offensive to halt production.

Further differences in approach were cited between the Allies and Axis Powers. The inter-war years had seen the concentration of technical expertise within the Royal Air Force move towards the Senior Non-Commissioned Officer and, in particular the Halton apprentices. These individuals, with their considerable technical knowledge, were the backbone of maintenance support and successive Medical Officers' reports commented on the healthy lifestyles and innovative approach typical of the Royal Air Force's maintenance and support personnel.

The comments made regarding the quality of GD officers specialising in technical disciplines seemed a little harsh, as it was lack of numbers, rather than lack of quality, that was the main concern.

Those who volunteered for technical duties, were offered advanced promotion but did not stay within the specialisation long enough leading to problems of continuity. In 1940, the Treasury blocked moves to pay Technical Officers on the same terms as other GD officers. The debate continued throughout the Battle of Britain before the re-emergence of the Technical Branch. Concern was voiced at the lack of research to determine how many technical officers were in the Royal Air Force at the start of WW II as opposed to the end. Many pre-war Warrant Officers ended the war as squadron leaders and wing commanders. An offer was made from Air Marshal Harland that he had a considerable number, but not a complete collection, of old Air Force Lists which may provide the basis for some statistical research in the absence of 'missing' Air Ministry records. It was reported that the Air Officer Engineering (Far East) demanded an extra junior officer per unit to limit the span of control to 50-60 men per officer. However the Chief Engineer Signal Units stated that as he could cope with his flying duties, signal duties, maintenance duties and command 80 men then everyone should be able to cope!

Was there animosity between technical and GD officers?

Not specifically but there was considerable animosity between technical and ground trade sergeants and sergeant pilots.

The logistics problems so far discussed are not specific to air operations. Are there any examples of deployed air operations being halted for more specific air related logistics reasons?

WW II did not present uniform logistics problems due to the variety of campaigns. In Burma, the operation of the Dakota, a very well developed aircraft, resulted in high rates of serviceability but this was against a complete lack of opposition from the Japanese Air Force. By contrast, during the Greek campaign, 37 and 38 Squadrons managed 12 sorties over a 16 month period. Despite the resolution of many of the North African campaign's logistics problems, the Greek campaign generated considerable problems due to terrain and remote geography. Problems were compounded by considerable numbers of engines being tied up in repair shops. By 1942 lessons were starting to be learnt and the situation started to ease.

The situation regarding the priority afforded to different theatres was discussed. The Far East was always a poor relation to the European campaign. It was not possible to afford equal priority until much later in the war once the European theatre had become more stable. It was only possible to concentrate on one emergency at a time or both might be lost.

A discussion followed on servicing times during operations. Many non-essential tasks were dropped to change an engine which, if followed properly, would increase the change time from half day to a week, but this could only be done against a solid, historically supported, servicing record. Following the Falkland campaign, ACAS asked why these truncated timescales could not be followed through as a matter of routine: he clearly missed the point!

What were the contributory factors leading to the failure of the Crete Campaign?

The first factor was the compromising of ULTRA and a general lack of communications throughout the campaign. General Wavell had his own intelligence sources which he employed to direct a withdrawal rather than a true campaign. Australian and New Zealand Forces were ordered to withdraw from, rather than hold, positions. The Royal Air Force withdrew relatively quickly following losses incurred on the ground.

What was industry's reaction to the change from Fly Away Packs (FAPs) to Priming Equipment Packs (PEPS)?

Clearly, the impact on industry was a reduction in spending as less

equipment was being provisioned. However, equipment was still being provisioned especially for aircraft fleets which traditionally had not needed FAPs. Work is underway within the SMG to meet these requirements.

How does the current change from military to civilian flying instructors affect the ability to give and take orders?

Need to differentiate between contractors' staff and MOD civil servants. As far as the former is concerned, time will tell. However, the experience from other air forces who use a similar system has proved it to be more than adequate. Flexibility is reduced as the pool of military pilots available is reduced. As far as civil servants are concerned, they are interchangeable with uniformed colleagues and fit into the normal chain of command in a fully integrated manner. It was commented that civil servants were deployed to the Gulf area as design engineers in support of comms equipment to ensure capability.

Discussion continued to identify that individuals could go through their entire flying training without meeting or commanding airmen. It was pointed out that this could also happen in the past with an example offered of an individual reaching wing commander rank without commanding airmen. The operational manpower mix remains much the same at unit level however the concentration at PTC and LC is much higher. It is possible that another 'Airworks' is likely within these Commands.

What is the impact of Computer Modelling in validating our requirements?

It was reported that the Logistics Support Services modellers had a number of models to predict requirements and consumption and recently a second model to validate this data. A number of validations against peacetime operations had been completed and these had resulted in a 98% accuracy. These models are now attracting the attention of other air forces but it was worth noting that investment in predictive modelling is lacking in civilian companies.

Did the winning of the Gulf War by hiring commercial aircraft and sealift prove cost effective over the costs of maintaining a large national merchant marine and aircraft carriers?

The costs of hiring are then roughly split 1/3rd operating charges and 2/3rd insurance premiums. Of the vessels chartered for the Gulf War, 8% came from the British Register although a subsequent National Audit

Office report was critical of the Army-run shipping charter operations. With no 'on costs' or costs to hold, chartering is a convenient, cheap solution to the logistics requirement. The Gulf War was, however, split into convenient logistics phases which aided the chartering process significantly. In general, a ship charter requires some 27-35 days whilst an aircraft can be hired with seven days' notice. From a political perspective, chartering may result in a slowing of response as it takes longer to construct a resolution. This is likely to be at least focused on by the Strategic Defence Review (SDR).

How is the balance between aircraft and availability achieved?

Before the Gulf War, the RAF had 300 or so aircraft, none of which were in an ideal state for operations. Economic issues prevented the best fit for the fleets, resulting in sub-optimal weapons and equipment packages. It was necessary to take modified aircraft forward in small batches as they became available with their crews sufficiently trained. It was necessary to compress the training, evaluation of tactics, integration of contractors to meet the deployment timetable and account for attrition losses. The main and most complex task was the ability to manage the overall fleet, the support arrangements and the various variants within the fleet.

It was noted that another balance must be the ability to maintain 'in-house' or provide sufficient funding to industry to provide the latent capacity. The WW I example of MT being used in peacetime by commerce but available for use by the RFC has modern analogies with the possible replacements for the AT fleet and the requirement for outsized airlift (currently not available to the RAF) of leasing C-17 aircraft for normal use by civil air carriers. As always, it was essential that the RAF remained not only an intelligent customer but remained a customer with the ability and capability to perform like tasks.

There followed a discussion on contracting strategies. It was noted that the first contract at Llanbedr had been won by Shorts; however, at re-let the contract had been rewritten to produce a greater saving. In the RAF's defence it was stated that much had been learnt from these early contracts and we were now much better at writing specifications and letting contracts. It was also explained that larger scale contracts involve the transfer of existing staff and that, with the contraction of the RAF, there were considerable numbers of trained people available to work for contractors.

LOGISTICS LESSONS FROM THE PAST DEPLOYED OPERATIONS

Group Captain Peter Dye

'Wot makes the soldier's 'eart to penk, wot makes 'im to perspire?
It isn't standin' up to charge nor lyin' down to fire;
But it's everlastin' waitin' on a everlastin' road
For the commissariat camel an' 'is commissariat load . . .'

Northern India Transport Train – Barrack-Room Ballads. Rudyard Kipling.

Logistics is not so much a science as an art and yet, under the pressure of tighter budgets and downsizing, there is great temptation to adopt the view that sophisticated resource modelling and realistic simulation (including wargaming), together with careful staff work, are sufficient in themselves to provide for effective support of deployed operations. But anyone who has had to maintain aircraft or other complex weapons systems, whether at home or overseas, will know how the unexpected can rapidly degrade effectiveness, notwithstanding the resources available, or the depth and detail of the advance planning.

I am not suggesting that we cannot continue to use the techniques mentioned above (and others) to control costs and improve our logistics support, but it is also true that much of our recent experience relates to a scenario that increasingly appears to have been driven by an exceptional period in world affairs. Whether we like it or not, our current methods of doing business largely reflect the lessons learned in the Cold War and are tailored to supporting the main base concept. Of course, we cannot simply abandon tried and tested procedures, but we are entering a period of radical change and a concept of operations that owes more to the RAF's experience up to 1945 than the subsequent 50 years of 'peace'. The Mobility and Deployed Support Study has provided the conceptual framework for the way we should develop our capabilities to deal with these new realities. Nevertheless, it is very much new territory, with few examples and little practical experience to draw upon. That being so, I would suggest that there is considerable merit in looking at how the RAF supported deployed operations in the first half of this century, as part of the on-going process to develop our post-Cold War logistics strategy.

In case there are those who suspect that my thesis implies that things were done better in the past – that there was a sort of logistics golden age –

I would mention the deployment in 1916 of No 29 Sqn to join the Expeditionary Force. No 29 Sqn had been formed at Gosport from No 23 Sqn in November 1915. Towards the end of January 1916, twenty DH 2 Scouts were allotted to the new squadron. It was decided (somewhat rashly as events proved) to deploy the groundcrew and support personnel, together with the squadron transport, ahead of the aircraft move. The former proceeded overseas on 14 March. Ten days later, the aircraft set off for Dover, but mechanical problems (exacerbated by inexperience with the new aircraft, the fact that the squadron had been largely without groundcrew for nearly two weeks – whilst most of those remaining had contracted measles), poor weather and accidents en-route meant that by the second week of April only twelve machines had actually reached France. The overall attrition was even worse than one might suppose, since the original allocation of twenty aircraft had been supplemented by further direct ex-factory deliveries (but none with compasses fitted, which raised some concerns amongst those pilots, who had managed to reach Dover, as to the wisdom of a Channel crossing), HQ RFC subsequently calculated that, '. . . the total number of machines consumed, in order to deliver at St Omer 12 serviceable, was 27 . . .' The majority of these were scattered around Southern England, some written-off, whilst others ditched in the Channel or crashed on landing in France. The pilots involved fared little better, suffering their fair share of injuries, as well as measles, such that the last arrived in France over two weeks later. All in all, it was not one of the RFC's finest hours.

Whilst this catalogue of disasters may be entertaining at this distance, I doubt there were any fundamental lessons to be learnt. However, there are aspects of RAF deployed operations in the Second World War that are actually quite instructive. One example is the logistic support for the RAF elements involved in Operation TORCH, the North African landings that took place in December 1942. Some 450 aircraft were involved in the eastern operation, centred on Algiers, tasked with providing air cover for the shipping and ground forces, and, once ashore, to protect against air attack and to support the subsequent land advance. Immense difficulties were encountered as this was the first large-scale amphibious landing to be undertaken by the Allies. It was also the first real test of Anglo-American co-operation, the conduct of joint operations and, most importantly, of joint planning. As far as the air element was concerned, it was agreed that the Army would provide POL and weapons, whilst the RAF would furnish all

support vehicles, ground equipment and technical stores. The relevant equipment was packed at maintenance units in the UK to schedules prepared by the Air Ministry, but the sponsoring branches had no visibility of what was actually provided. It was subsequently reported by the units making up the packs that there were 72% inabilities. All 'pack-ups' were allocated, in the interests of security, Field Unit Serial Numbers. The code for these numbers was given a very limited distribution and not included in the administrative instructions. All stores were then loaded at UK ports for travel by convoy directly to join the Eastern Task Force at Gibraltar.

The actual landings met little opposition and the advance RAF ground parties were able to reach their designated airfields and receive the first Allied aircraft by 1030 on the morning of D-Day. Thereafter matters got more difficult. Enemy air attacks commenced in earnest; fuel was in extremely short supply and essential equipment either did not arrive at the beach-head or was lost on landing (this problem was exacerbated by the limited attention that had been paid to the loading of the ships in the UK such that in some cases it took two days to unload priority equipment). It would be wrong to suggest that the planners had not anticipated the difficulties likely to be faced in landing large quantities of stores across open beaches, since it had always been intended to bring the bulk of the equipment needed to support the subsequent land and air operations through the port of Algiers. But, not unexpectedly, given the immense amount of material to be unloaded, the docks were rapidly saturated. More significantly, however, the RAF disembarkation staff of twenty-six all ranks was quite incapable of sorting the mountains of equipment being discharged. The result was that not only were the docks swamped with piles of stores which in fact would not be needed for many weeks, but there was also no means of distinguishing between cases. A great deal of unnecessary equipment found its way to the forward areas in place of items that were urgently required. To make matters worse, although the consumption of ordnance was far less than had been anticipated, the early consignments of bombs arrived with the wrong components or without components at all; this included fusing links. By the end of January the process of marrying up bombs with tails still had not been completed satisfactorily (without wishing to exaggerate, there are echoes here of our experience during Op GRANBY). There was also the usual share of unexpected, and hence unplanned, maintenance problems. For example, the soft state of the airfields following heavy rain resulted in a large number of

aircraft ground looping and breaking their propellers such that stocks were rapidly exhausted.

Logistic problems did not end here. The numbers of RAF movements staff were totally inadequate to the task and thus had to rely upon Army movements personnel; but, without the key to unit serial numbers, the latter could only surmise for whom the equipment was intended. This generally ended in it being sent to the wrong unit, who, knowing only its own serial number, could not dispose of the equipment to its proper destination. As a result, much of the equipment off-loaded from the first convoy into Algiers did not reach the correct units until many weeks had elapsed. Finally, when the pack-ups were opened it was often to find that the items required were either missing or present only in reduced quantities.

Those involved in the handling of stores at Al Jubayl during Operation GRANBY nearly 50 years later may have noticed some similarities between their experiences and the problems encountered in Operation TORCH. In neither event was there effective enemy action to interrupt the supply chain and yet immense difficulties were encountered simply as a result of the scale and pace of the build-up, the sheer volume of stores and the almost impossible task of locating specific equipment amongst the countless crates/ISO containers on the dockside. One is forced to conclude that moving thousands of tons of stores across a continent has always been the simplest part (but not necessarily the easiest) of any logistic operation. My personal experience during Operation GRANBY would suggest, however, that even this statement has to be qualified. I recall on one occasion a serviceable aero-engine, urgently required at Muharraq, returning from Lyneham on the same lorry that had rushed it down there – much to the distress of the driver.

More importantly, the original inbound unserviceable engine was at that very moment winging its way back to the Gulf in the back of a Hercules! To be blunt, delivering the required item to the right hands, at the right place and at the right time remains the overriding challenge for any logistic organisation. It is also true that forging the last link in the support chain can be as difficult as assembling the remainder. It is a task made all the more challenging in a joint multinational environment, subject to the vagaries of host-nation support and the inevitability of unplanned (and hence inadequately provisioned) unserviceabilities. The way ahead must surely lie in both improving asset tracking and also providing greater visibility of the supply chain to all parties, including the consumer as well as the supplier.

One of the unique aspects of the RAF's logistic planning for Operation TORCH was the creation and employment of servicing commandos. These units comprised up to 150 RAF tradesmen, with intensive combat training, who were to be landed during the assault phase and would be capable of defending themselves (and their aircraft) whilst also undertaking the daily servicing, refuelling and rearming of aircraft operating from advance landing grounds/captured airfields until such time as the main squadron servicing parties arrived. In theory, the servicing commandos – although entirely comprised of Trade Group 1 (technical) personnel – could only provide rudimentary support as their tools and equipment would be necessarily limited. However, the two servicing commandos employed during Operation TORCH had to undertake the maintenance of many more squadrons, of several aircraft types, and for a considerably longer period than originally intended owing to the difficulties outlined above, as well as problems in assembling and moving forward the appropriate technical personnel. In fact, instead of being relieved after a few days they were employed continuously for five weeks without rest.

Notwithstanding the servicing commandos' efforts, the lack of maintenance facilities and skilled personnel soon began to make itself felt in the form of reduced aircraft serviceability. This is not to say that the logistic planning had failed to make provision for the sustained support of aircraft operations, but it had been envisaged that the majority of squadrons once ashore would be rapidly joined by their assigned maintenance personnel, as well as air stores parks (with sufficient equipment to support 30 day's maintenance) and repair and salvage units. Quite deliberately there had been no provision for major repair (beyond what the repair and salvage units could undertake) in the anticipation of a relatively brief campaign. In the event, the operational commanders decided to accelerate the aircraft deployment plan and this, coupled with the supply chain difficulties already outlined, meant that squadrons were compelled to operate for some time without support equipment, adequate servicing and repair arrangements, or even transport and signals support. Typical of these difficulties was the plight of the two Beaufighter night fighter squadrons called forward three weeks early. On arrival they had to be maintained by members of the aircrew, co-opted ground personnel from a collocated Hudson squadron and mechanics from a repair and salvage unit. To compound these problems, the Beaufighters' radar equipment had been removed for security reasons and sent by sea with the ground personnel. An emergency supply

of radar equipment had therefore to be flown out direct from the UK before night fighter operations could commence but, not surprisingly, the hastily assembled maintenance team found the radar extremely difficult to install without any specialist knowledge or the appropriate support equipment and tools.

Eventually, the 2nd Line maintenance units were able to come into action, but this did not immediately resolve every problem. The repair and salvage units found that, because of the delays they faced, an immense backlog of repairs and were effectively immobilised whilst the stores parks discovered that the storage space provided by the Army was but a fraction of their actual requirements; although eventually some additional space was found in local farm buildings. Strenuous efforts were made to recover this situation as the campaign developed by improving both the support arrangements as well as the mobility of the squadrons. Maintenance personnel in the forward area were reduced to a minimum to enable the squadrons to be placed on a mobile basis capable of movement at short notice utilising their own MT. The remaining maintenance personnel were withdrawn to the rear echelons. The forward stores parks were also reduced to 'immediate issue' stocks only (and the personnel reduced accordingly) whilst the repair and salvage units were totally withdrawn, other than small mobile sections to work with the squadrons. In general, these new arrangements worked well and would provide the pattern for all subsequent campaigns.

Amongst the many other lessons learnt from Operation TORCH was the need to schedule carefully the arrival of equipment and stores whilst ensuring that the necessary personnel and repair facilities were in place as early as possible to permit effective air operations. That said, it was also clear that too large a forward support organisation would take a disproportionate share of the available shipping/assault craft whilst also serving to hinder subsequent mobility. Exercises undertaken in the UK during 1943, in preparation for the Normandy landings, confirmed the over-riding importance of reducing what might today be referred to as the 'deployment footprint'. In fact, how best to organise the maintenance support for squadrons whilst enhancing their mobility was a question which Group and Command staffs had been struggling with since 1940. Prior to the expansion of the RAF, fighter squadrons were largely self-sufficient, each flight having the capability to undertake in-depth repair as well as the normal servicing functions. It was soon evident that this system could not

cope with the increased flying rate and greater technical complexity that accompanied the expansion programme. As a result, maintenance support was reorganised on a squadron basis, two flights being responsible for servicing tasks whilst the third flight undertook major repair work and the deeper inspections. This system, which today we would probably describe as an 'autonomous' maintenance organisation, remained in force for the first year of the war. However, during the Battle of Britain it was discovered that the mobility of squadrons was adversely affected and that the frequent squadron moves resulted in the maintenance personnel being increasingly detached from their units, sometimes being spread over at least three different stations.

In an endeavour to improve the mobility of the squadrons, and avoid the need to transport large ground parties and redundant bulky equipment from station to station it was decided to re-examine the maintenance system. After toying with a proposal to do away with all maintenance personnel and rely entirely upon station support (the 'centralised' approach), it was agreed that a 'semi-autonomous' organisation should be adopted, whereby the bulk of the repair responsibility, associated tradesmen and ground equipment would be transferred to the station 'maintenance party' leaving only sufficient squadron maintenance personnel to conduct daily servicing and minor inspection tasks. The squadron Engineer Officer would remain in the squadron but the station 'maintenance party' would provide echelons attached to each squadron; albeit under the command of the Station Engineer Officer. These echelons could also provide a mobile unit to accompany the squadron for 'base-base' moves.

Over the next few years this organisation was further developed to become almost fully centralised, such that the supporting technical personnel were in effect entirely divorced from the flying squadrons. A three-tier structure was introduced comprising, the 'Advanced Landing Ground' where quick turn-round servicing would be carried out by servicing commandos (as already described), the 'Airfield Area' capable of supporting three squadrons where servicing was fully centralised under the station 'maintenance party' and, finally, the 'Base Area' that undertook maintenance beyond the station maintenance party's capability or capacity to complete in under 48 hrs. The 'Airfield Area' was in essence a mobile station, but to achieve this it was necessary to create additional support units, including repair and salvage units and forward stores parks. This system was extremely successful in providing effective support to the

RAF's flying squadrons both through the North African and Italian campaigns as well as during and after the Normandy landings. It should be noted that, notwithstanding the centralised maintenance organisation, particular efforts were made to sustain squadron identity by affiliating 'Airfield Area' echelons to specific squadrons under a 'squadron' technical officer. This also served to improve the welfare and management of the technical personnel concerned. That said, such pragmatism was not allowed to detract from the overall policy of centralisation.

As a footnote, the sort of problems experienced by 29 Squadron in 1916 were resolved by making temporary provision at the base airfields in Southern England for maintenance support while the squadron servicing personnel established themselves in Normandy. In the event, the maintenance arrangements worked extremely well. The first servicing commandos landed on D+1 and received their initial aircraft on D+2 (on a temporary basis – for refuelling and re-arming). By the afternoon on D+3 some 3,500 RAF personnel and 815 vehicles had been landed. The permanent move of fighter squadrons to airfields in Normandy commenced on D+4, once the 'Airfield Areas' were ready to receive them, and thereafter the pace of deployment accelerated such that by the end of June a wing was arriving every five days. Once again, the servicing commandos had proved invaluable, not only enabling damaged aircraft to return to base but also ensuring an extremely high availability rate. Nevertheless, once the bridgehead was established and the 'Airfield Areas' in theatre, their importance rapidly declined and they were withdrawn at the end of July.

As in Operation TORCH, a number of 'environmental' maintenance problems arose. Although, rather than wet airfields the cause in this instance was dust. The soil on which the landing grounds were constructed contained a very high proportion of silica dust which lessened the life of engines, particularly those not fitted with air-cleaning devices (such as the Typhoon's Sabre). Unserviceabilities rose rapidly and it was only by pumping oil and water onto the airfield surface and minimising warm-up times that the problem could be contained (but not before 66 engines had been damaged beyond repair). There are echoes again here of RAF's experience in Operation GRANBY. I would-only add that maintaining sophisticated aircraft and weapons systems outside of their 'normal' operating environment is something that has to be practised. Careful planning, experience and foresight are not a substitute for the real thing!

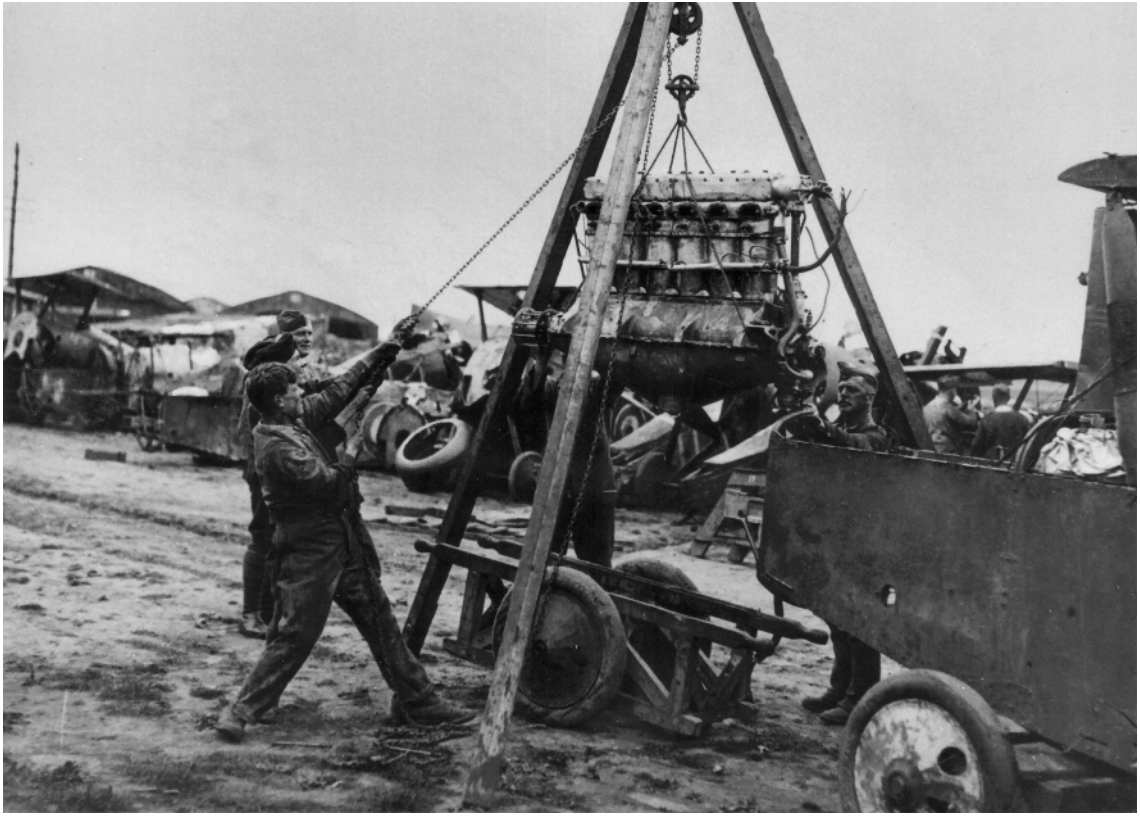
Following the Normandy breakout, the primary problem facing the

maintenance organisation was the ever lengthening lines of supply. Transport aircraft were used to supplement the supply chain and, in particular, to deliver aviation POL to help support the momentum of the advance. This was successful and at no stage were operational units ever prevented from carrying out sorties for lack of supplies. In order to avoid bottlenecks and minimise forward storage requirements the provisioning system was based upon a 'call-forward' principle, rather than the base organisation sending supplies into theatre at will. This has clear parallels to today's concept of 'just-in-time' supply and express chain management.

Turning to the lessons that we might draw today, I would first observe that the RAF's organisational structure to support deployed and mobile aircraft operations in the Second World War took some four years to perfect. The result was a lean, efficient system that sustained high availability whilst enhancing squadron mobility, flexibility and economy in manpower and equipment whilst enabling Squadron Commanders and airmen to concentrate on their operational responsibilities. It may well be that the servicing commando concept – given the remote possibility that we will again be required to participate in an amphibious assault on a hostile shore – will remain simply an historical curiosity. Nevertheless, and notwithstanding the passage of time and subsequent technological development, the lessons of 1939-45 provide much food for thought in deciding how best to develop logistics support. Do we really have the right maintenance organisation to cope with the post-Cold War era? Today, studies have focused largely on the mechanics of deployment support and the resourcing implications rather than the organisational aspects and how this might be developed to enhance mobility and reduce the forward support requirements, particularly the deployment footprint. I have always been an enthusiastic proponent of the semi-autonomous maintenance organisation, believing that the enhanced squadron 'esprit de corps' brings very real benefits. But, this should not blind us to the very real issue of whether such a system is the best or indeed the only way to support deployed operations in the future. Is there not a very real danger that we are solving tomorrow's problems with today's solutions? At the very least the question should be debated.

Editorial Note: The above article did not form part of the seminar and originally appeared in Air Clues *in September 1996: we are grateful to Group Captain Dye for arranging that it could be reproduced herein.*

DH 2s of No 29 Sqn at Abeele in 1916. The early aeroplanes were delicate, fragile and unreliable. Their integrity deteriorated rapidly when exposed to the elements, thus hangarage was essential.



‘Repair and salvage were of critical importance to enable the Royal Flying Corps to continue operations in the face of immense attrition.’

Tripolitania 1943 – personnel of a Repair and Salvage Unit recover a Spitfire.

Al Jubayl during the Gulf War – Baldrick Lines are in the foreground with ISO Container Park behind. The problems in locating site equipment were such that it was found easier to dispatch the items again than to continue to search for then in-theatre.

BIOGRAPHICAL NOTES

Group Captain Peter Dye OBE was educated at Sevenoaks School and Imperial College, University of London. He joined the Royal Air Force in 1972 as a University Cadet and, following training at the Royal Air Force College Cranwell, joined No 57 Sqn (Victor tankers) at Marham in 1977 as the Junior Engineering Officer. He subsequently served at Wyton as OC Canberra Servicing Flight and Goose Bay as the Unit Engineering Officer.

On his return from Canada in 1981, he moved to the Central Servicing Development Establishment at Swanton Morley as a studies officer specialising in computer-related engineering projects. He was promoted in 1984, moving to the Maintenance Analysis and Computing Establishment, also based at Swanton Morley, where he set up the RAF Small Systems Group. In 1986, he returned to aircraft engineering, on posting as Senior Engineering Officer No IX Sqn (Tornado) at Honington, subsequently moving with the squadron to Brüggen later that year.

He left Germany in 1989, to attend No 82 Advanced Staff Course at Bracknell from where he was posted to RAF Coltishall as OC Engineering and Supply Wing, becoming heavily involved in the deployment, modification and support of the Jaguars employed in the Gulf War. In 1991, he took up post as SSO to AOCinC Support Command and subsequently, PSO to AOCinC Logistics Command when it was formed on 1 April 1994. More recently, he served as Director of the Department of Specialist Ground Training at Cranwell from 1994 to 1996 and is currently a member of the 1997 Course at the Royal College of Defence Studies.

Professor Robin Higham served as a pilot in the RAFVR, 1943-47, with No 48 Sqn (Dakotas) in SE Asia Command. Subsequently he has enjoyed an academic career spending the last 34 years at Kansas State University in the USA. He was editor of *Aerospace Historian* for 18 years from 1970 and is the author of several books including *The British Rigid Airship: a study in weapons policy, Airpower: a concise history* and the forthcoming *The Bases of Air Strategy* – building airfields for the Royal Air Force 1934-1945.

Humphrey Wynn served during the Second World War (1940-1946) as a pilot in the Middle East Air Force and in Transport Command, then from 1948 to 1980 in the RAFVR, mainly on public relations duties. After post-war university studies, he entered journalism under the Kemsley Graduate

Training Scheme, becoming a reporter and feature writer, then in 1956 joined the aviation magazine *Flight*, with which he did two tours of duty, interspersed with public relations assignments at the SBAC and the Air League. From 1971 to 1984 he was with the Air Historical Branch, producing three studies – on the post-war bomber role, the RAF's Strategic Nuclear Deterrent Forces and (after retirement) a history of RAF Transport Command. He has also written books on other RAF subjects and earlier this year was awarded the C P Robertson Memorial Trophy by the Air Public Relations Association for 'constant effort over a number of years in the interpretation of the Royal Air Force to the public.'

Dr Sebastian Ritchie received a PhD in history from the University of London in 1993, and subsequently lectured at the University of Manchester for three years before his appointment as historian at the Air Historical Branch in 1996. He is the author of several articles on aircraft manufacturing between the two World Wars, and his first book, *Industry and Air Power*, was published in May. He will now take the story forward and discuss the environment in which the RAF's post-war logistics planning for deployed operations was conducted, and in particular the decline in mobility that accompanied decolonisation and the onset of the Cold War.

Group Captain David Packman was educated at Worcester Royal Grammar School and the Royal Air Force College, Cranwell. Commissioned into the Equipment (Supply) Branch in December 1959 and posted to RAF Wittering where two squadrons of Valiant B1s were based. With the exception of the almost inevitable tour of duty at No 16 MU, RAF Stafford, his other junior officer postings had a definite 'operational' bias and included specialist fuels and movements duties. Promoted squadron leader in 1969 most of his remaining 18 years in the Royal Air Force were closely involved with mobile operations and joint warfare. One interregnum was a posting as PSO to DGS(RAF) at the same time that, the then, Wing Commander Alcock was PSO to DGEng(RAF). He commanded the Tactical Supply Wing from 1975 to 1977 and during his final tour of duty (in MOD from 1985 to 1987) was the sponsor for that wing. Bearing in mind the fate of most 'Suppliers', it is his proud boast that in 31 years' service he only spent two working days at Harrogate!

Married with two adult sons, David Packman is now the General Manager of the High Wycombe Council for Voluntary Service. He is still

an active oarsman and umpires at major regattas, including the National Championships.

Paul Crotty: The offer of a job from Lucas Aerospace enticed Paul out of the RAF ahead of his normal retirement date. At the time he was Director of Logistics Operations at Whitehall with special responsibilities as the Director of Air Movements. For a while he was also Head of the Supply and Movements Branch.

Prior to Whitehall Paul served on Sir Michael Alcock's staff at Strike Command as ACOS Logistics and arrived there in May 1990 just in time for the Gulf War. In earlier appointments Paul served as a Director of Supply Management at Harrogate; he was the Station Commander of RAF Stafford and, during the Falklands War, he had responsibility for aviation fuel. Paul also served at the NATO HQ in Holland for three years.

During his career Paul attended the RAF Staff College at Bracknell, the NATO Defence College in Rome and the Royal College of Defence Studies. He also found time for a one-year sabbatical at Manchester University where he did the equivalent of today's MBA.

Paul is now a Marketing Executive and runs the Lucas office in London.

Group Captain Robin Springett was born in 1944 and was educated at Eton House and Southend College of Advanced Technology; he was commissioned into the Equipment Branch in 1964.

He became Ops Officer on the embryo Tactical Communications Wing, then known as 38 Group Support Unit. Four years with the Army in Singapore followed; after which he became a founder member of the Tactical Supply Wing, being first Training, then Ops Officer. He went back to supply at Lyneham, and on promotion in 1975 became OC Supply at North Luffenham. A Headquarters Supply Staff posting to RAF Germany followed, where he gained much valuable knowledge of support for aircraft and aero-engines. Next, a tour in the Supply Policy Directorate concerned with Stockpile Planning and War Reserves was interleaved with a three-month interlude in 1982 on Ascension Island as Logistics Officer during Operation CORPORATE. Then a move to Hereford to command the Supply Training Squadron, where he introduced new fuels and explosives courses. Following promotion to wing commander in November 1984, he moved to SHAPE to head the Logistics Policy Branch, where he represented SACEUR on the NAMSO Committees, EUROLOG and SACLANT Logistics Co-ordination Board, ran the ACE Logistics Co-

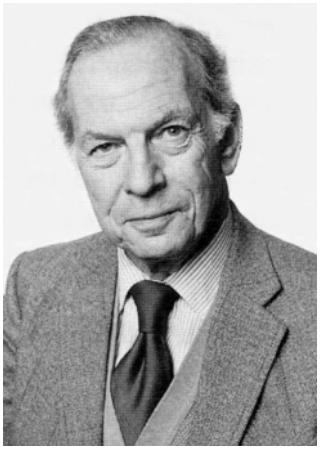
ordination Centre, and rewrote the ACE Manual 80-50 Logistics Policy. In June 1988 he became OC Support Wing at 16 MU, RAF Stafford at a time when NMS and trial budgets loomed large. April 1990 saw a move to the Saudi Arabian Office in London for Supply Duties concerned with the introduction into the Royal Saudi Air Force of weapon systems under the *Al Yamamah* Programme. This was interrupted by the Gulf War, and early January 1991 saw him commanding the Tactical Supply Wing in Saudi Arabia. There followed a return to the Saudi Office where he worked closely with British Aerospace and the Royal Saudi Air Force, until promotion to group captain and assumption of the position as Deputy Director Support Management 11(RAF) in April 1993.

His current appointment, Group Captain Logistics Operations at Headquarters Strike Command, he has held since June 1994. He is responsible for the co-ordination of logistics support to RAF Forces deployed on operations and for larger exercises. He is responsible for implementing many of the changes in logistics support to operations identified in the Mobility and Deployed Support Study (1993). Latterly, he has been responsible for establishing current policy and practice for RAF logistics support to operations in the Permanent Joint Headquarters era, notably setting up logistics command and control through the Logistic Support Centre and integration into the Contingency Action Group procedures in Headquarters Strike Command.

Group Captain Springett is Chairman of the Royal Air Force Ornithological Society and Strike Command Cricket. His wife, Julia, is a RN officer stationed at Northwood, he has two adult sons.

SIR JOHN SLESSOR AND THE PREVENTION OF WAR

Professor Sir Michael Howard CBE MC FBA



Michael Howard was born in London in 1922. He was awarded his Bachelor's and Master's degrees in Modern History at Oxford and served with the British Army in the Italian Campaign, 1943-45, being twice wounded and awarded the Military Cross. He began his teaching career at King's College, University of London, in 1947 as Assistant Lecturer in the History Department, and began to specialise in the history of war. In 1953 he was appointed the first Lecturer in War Studies and spent the next ten years building up an independent department, being awarded the title of Professor of War Studies in 1962. Simultaneously he helped to found the International Institute for Strategic Studies, of which he is now the President.

In 1968 he moved to the University of Oxford as Senior Research Fellow at All Souls College, and in 1977 became Chichele Professor of the History of War. In the same year he was awarded a DLitt. from Oxford. In 1980 he was appointed Regius Professor of Modern History and held the post until 1989 when he accepted the Robert A Lovett Chair of Military and Naval History at Yale University, from which he retired in 1993. He is a Fellow of the British Academy and a Foreign Corresponding Member of the American Academy of Arts and Sciences. He was for many years a member of the Council of the Royal Institute for International Affairs.

Professor Howard's many books and articles include The Franco-Prussian War *(1962),* The Continental Commitment *(1972),* War and the Liberal Conscience *(1978), and* The Causes of Wars *(1983). He was also responsible with Professor Peter Paret for the translation of Clausewitz'* On War *which is now the standard version in English. His most recent publication is* Strategic Deception in the Second World *War (1990) and his latest book of essays,* The Lessons of History, *was published by Yale University Press in 1991. His awards include the NATO Atlantic Award (1989) and the Paul Nitze Award (1994) from the US Centre for Naval Analyses.*

In November 1959, addressing the United States Air Force Academy, Marshal of the Royal Air Force Sir John Slessor informed his audience that... 'The aim to which the existence of the Royal Air Force is dedicated is the prevention of war.[1] By that time nobody would have been surprised by that definition. It had already become the conventional wisdom. But ten years earlier it would certainly have raised eyebrows, not least within the Royal Air Force itself.

In 1949, and for several years thereafter, the assumption had been that the RAF must be prepared to fight a war against the Soviet Union that would be a re-run of World War II on an enormous scale, with the addition of nuclear weapons. Some idea of the conventional wisdom of that day can be found in a work published in 1949 by a senior American defence scientist Dr Vannevar Bush, entitled *Modern Arms and Free Men:*

'Great fleets of bombers would be in action at once, but this would be the opening phase only . . . They could undoubtedly devastate the cities and the war-potential of the enemy and its satellites, but it is highly doubtful if they could at once stop the march of great land armies. To overcome them would require a great national effort, and the marshalling of all our strength. The effort to keep the seas open would be particularly hazardous, because of modern submarines, and severe efforts would be required to stop them at the source. *Such a war would be a contest of the old form, with variations and new techniques of one sort or another. But, except for greater use of the atomic bomb, it would not differ much from the last struggle.'*[2]

These were the common assumptions when Slessor became Chief of the Air Staff in 1950. Such a war was seen as being, if not inevitable, at least very likely, and this continued to be so during the two years when he held that office. After his retirement global tension ebbed. For one thing the death of Stalin brought into power as leaders of the Soviet Union men who, if equally dedicated to the ideology of Marxism-Leninism, were at least more rational and approachable than that increasingly paranoid dictator. For another, the development of thermonuclear weapons had forced even the most conservative of strategists to revise all their assumptions about the nature of future war. None the less, even before he left office, and even before the development of thermonuclear weapons was known to be feasible, Slessor had thought through, and had persuaded many (though by no means all) of his service colleagues and political masters to accept, a doctrine of nuclear deterrence that was to provide the basis for all our

strategic thinking until the end of the Cold War.

The concept of deterrence through Air Power came naturally to Slessor, but he was no narrow-minded protagonist of the traditional doctrines of the Royal Air Force, let alone of the Bomber Command in which he had served with distinction. His career had given him wide experience both of inter-Service co-operation and of the interface between political and military decision-making. He had attended the Army Staff College, and written a book, *Air Power and Armies*, that was for long to be a leading text on the subject of army-air co-operation. He had been able to put many of his principles into practice while serving on the North West Frontier in India in the 1930s. During the Second World War he had co-operated closely with the Royal Navy when he commanded Coastal Command at the height of the Battle of the Atlantic, and then, as Deputy Commander-in-Chief of Allied Air Forces in the Mediterranean, he learned much of the potentiality, and even more the limitations, of air power, especially in the conduct of the Italian campaign. Finally, he spent two post-war years as Commandant of the Imperial Defence College before becoming Chief of the Air Staff in 1950; a year in which, with the invasion of South Korea, the Cold War reached its depths and, to many, global war appeared imminent.

By that time Slessor had already formulated the views about strategy that were to remain the basis for his thinking throughout the rest of his life. He had set them out in an address to the United States National War College in April 1948.[3] It was a bad time. The communist *coup d'etat* had just taken place in Prague; there was deadlock between the Soviet Union and the Western powers in Germany, and the political situation in Italy made civil war in that country seem by no means unlikely. Slessor's proposals for dealing with the situation were simple. Western policy should be 'to prevent war with Russia . . . and if war cannot be prevented, to win it as effectively as possible.' First priority should therefore be given to 'that form of force which affords the most obvious *deterrent* to attack by Russia': and that, without any doubt, was Air Power.

If war did break out, Slessor's expectations were much the same as those of Vannevar Bush. 'We may', he warned, 'have to undertake the mass evacuation of young and old people and invalids on an unprecedented scale . . . leaving the United Kingdom stripped and at action-stations with every able-bodied citizen of either sex that remains organised as part of the defence system, so that Britain can serve . . . as an unsinkable aircraft carrier for the striking forces of the United Nations.' The Navy would be

fully stretched to keep the sea-lanes open, but the primary task of the Army would be civil defence. Yet, Slessor went on to suggest, such a major war 'holds out such appalling prospects that neither side would take it on . . . and we might find ourselves back in a sort of Crimean war . . . a Communist coup in Italy might result in Italian troops with US and British support fighting Jugoslav troops with Russian and Bulgarian support at the head of the Adriatic, with the Quadripartite Commission (the inter-allied body responsible for the administration of occupied Germany) still sitting in Berlin . . . We should not reject the idea of a local trial of strength . . . a localised testing of how much we or they mean business.'

Now note three things about what Slessor had to say. First, we find here, already clearly formulated, the concept of deterrence – and implicitly, bilateral deterrence, even though the Soviet Union had yet to test their atomic bomb. *Neither side,* he frankly admitted, might be prepared 'to take it on'; and that raised problems of mutual deterrence which he did not at that time explore and which he never really solved. Second, Slessor saw the primary instrument of deterrence as lying in Air Power. And third, two years before the invasion of South Korea, he already visualised the contingency of 'limited war'. Other thinkers were working along similar lines. About the use of air power as a deterrent there was of course nothing new. It was a concept familiar within the Royal Air Force, whose expansion had been given priority by Neville Chamberlain in the 1930s precisely in the hope that it would deter Hitler from further aggression. The American political scientist, Bernard Brodie, had indeed taken this thinking to its extreme in a work, *The Absolute Weapon*, published in 1946, in which he made the startling pronouncement 'Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them. It can have no other useful purpose'.[4] It was not a view that made him popular with the United States Chiefs of Staff, and it is doubtful whether at that time Slessor had ever heard of him. At the same time the British military writer Basil Liddell Hart, whom Slessor knew well, was thinking about 'limited wars'. 'Fear of atomic war,' he wrote, 'might lead to indirect methods of aggression, infiltration taking civil forms as well as military, to which nuclear retaliation would be irrelevant. Armed forces would still be required to fight 'sub-atomic war'.[5] But neither Brodie nor Liddell Hart, nor indeed any other strategic thinker, was in a position to translate their ideas directly into policy, as could Slessor during those vital years 1950-52.

As we have seen, Slessor became CAS just as the invasion of South Korea convinced the American leadership, if no one else, that the Cold War with the Soviet Union was about to turn hot, and resulted in a crash programme of re-armament in which the British loyally joined. This programme specified for the defence of Western Europe a force of 96 divisions and 9,000 aircraft, of which the United Kingdom was to find 9 divisions and 1,550 aircraft; targets established at a NATO conference in Lisbon in 1952, and known thereafter as 'the Lisbon Goals'. These were described by Slessor himself at the time as 'an economic impossibility, a logistical nightmare, and a strategic nonsense'.[6] This re-armament programme, promoting as it did a huge rise in world commodity prices at a time when the United Kingdom was already struggling with a desperate balance of payments problem, resulted in an economic crisis that the second Churchill administration inherited when it came to power in 1951. The following year the urgency of the military crisis ebbed with the stabilisation of the situation in Korea and continuing Soviet quiescence in Europe, so the government ordered the Chiefs of Staff to make drastic reductions in military appropriations. By now Slessor was Chairman of the Chiefs of Staff Committee; and it is no disrespect to his immensely distinguished colleagues, Admiral Sir Rhoderic McGregor and Field Marshal Sir William Slim, to say that it was largely due to his leadership that the British military was able to come forward with clear and agreed proposals based on a comprehensive strategic theory that enabled their political masters to tailor their armed forces to meet the political challenges facing them at an acceptable economic cost. It was certainly the first time they had done so in the twentieth century, and I doubt whether they have done anything comparable since.

You will all know the story of the gestation and birth of the famous report on Defence Policy and Global Strategy of 1952; how Slessor took his colleagues on their own, without their staffs, for a week-end to Greenwich. There the three of them hammered out a paper that was to remain the framework of British defence policy for a further decade and lay down principles which were to guide Western strategy until the end of the Cold War forty years later.[7] Slessor's phraseology ran all through it. The principal objects of Allied strategy, it stated, 'are to prevent Russia and China from gaining their ends by infiltrating and disintegrating the Free World, *and to prevent war*' (emphasis added). 'The first essential of Allied policy must therefore be to establish and maintain for as long as possible *a*

really effective deterrent against war'; so priority should be given to air-strike forces. 'We conclude' the paper continued, 'that war is unlikely provided that the Cold War is conducted by the Allies in a patient, level-headed and determined manner . . . Provided that *the great deterrent* of atomic attack is kept in being . . . the likelihood of war is more remote that it was thought two years ago.'[8] This phrase, 'The Great Deterrent' was one that Slessor made his own, and he continued to use it for the rest of his life.

War of course might happen, the appreciation continued, and for that eventuality strong conventional forces, especially naval forces, must be kept in being. Even if the homeland of both belligerents were to be devastated by atomic attack, the conflict might go on, in what became known as a 'broken-backed' manner. Slessor himself was sceptical about this, and only his desire to avoid a total breach with the Royal Navy made him lend his signature to the idea of 'broken-backed' war. The development of thermonuclear weapons was to make him more sceptical still.

Shortly after his retirement Slessor published a book, *Strategy for the West*, in which he set out his views at some length.[9] It was a seminal work. In it he laid out a strategy for the conduct of the Cold War that was to be followed, and followed successfully, for the next thirty-five years. During those years so many hundreds of books and thousands of articles were published about nuclear strategy (most of them quite useless and some of them, I have to admit, by me) that it is immensely refreshing to re-read that book and remind ourselves of Slessor's sterling common sense, which was as evident in his political judgements as in his military. It was not the task of the West, he insisted, to eliminate Communism; it was 'to drive it back behind its frontiers and keep it there.'[10] He had no time for the kind of crusade that was at the time being preached in the United States. 'We have' he wrote, 'no God-given mission to destroy Communism'. Rather 'our policy must accept that our opponents have their own rights, hopes and fears . . . [and] must be a reciprocal programme of Live and Let Live.'[11] It required great patience and self-restraint in order to prove 'that the Western way of life is better than the Communist way of life', and it meant accepting, perhaps for many years, 'a heavy burden of armaments.'[12] But this would provide time and opportunity 'for the forces of sanity that are at work in the world to assert themselves.'[13] It did, and they have. Few policies, either political or military, have ever been so triumphantly vindicated.

Slessor made it clear that the main 'burden of armaments', would be made up of those weapons whose task was to *prevent* war. Economies could then be made in all the others. Freed from the constraints imposed by his colleagues in the senior Services, Slessor was now able to state categorically his view that the day of 'balanced forces' was over. 'We can no longer afford the attempt to superimpose the new atomic air strategy on top of the old conventional strategy' he stated, 'so we . . . must, and fortunately can, make a virtue of necessity. We must maintain atomic air power to prevent war, and we must supplement and support it by conventional forces . . . of a size and cost that the free nations can afford to maintain without breaking themselves.'[14] These would still be needed to deal with limited wars of the Korean type, and it would be the function of strategic air power to keep them limited; 'to hold the ring and prevent them from spreading, by the threat of the Big Stick in the background.'[15]

But what if nuclear war did break out? The Russians might be effectively deterred from using 'all-out war' as an instrument of policy, but what about the West? Slessor frankly accepted the possibility that the West might itself have to initiate nuclear war in defence of its vital interests and 'not even shrink from striking the first blow as an alternative to bloodless defeat.'[16] But would we not be ourselves deterred from striking the first blow by fear of Soviet nuclear retaliation? Here Slessor was less than convincing. He admitted that defence of the United Kingdom against enemy nuclear attack was impossible, except for certain key installations. As for everybody else, he suggested, they must just grin and bear it. 'There are worse things' he argued, 'than physical extinction.'[17] The British people would simply have to 'steel themselves to risks, and take what comes to them, knowing that thereby they are playing as essential a part in the country's defences as the pilot in the fighter and the man behind the gun.'[18] Here it must be said that Slessor lost touch with reality. There could be no comparison between the aftermath of a nuclear, let alone a thermonuclear, strike and the German blitz of 1940. The problem of 'self-deterrence' as it came to be called, was not to be solved by this kind of exhortation, and he must have known it.

So what was the answer to the problem of 'self-deterrence'? Slessor never found it, but neither, I think, did anyone else. He countered the proposed solution of the CND with their cry for the abolition of nuclear weapons by declaring that 'it never has made and never will make any sense trying to abolish any particular weapon of war. What we have to

abolish is war.' Nuclear weapons had done just that, so 'the greatest disservice that anyone could possibly do to the cause of peace would be to abolish nuclear armaments *on either side*' (emphasis added).[19] But the logical inconsistency remained. If the Soviets retained their own nuclear weapons, as Slessor recognised as being not only inevitable but even desirable, would not the West be deterred from using theirs even under the most extreme circumstances? This problem was to obsess strategic thinkers for the next thirty years, and so far as I know they never came up with an answer.

Slessor and the Air Staff had hoped, at least initially, that by pre-emptive strikes against Soviet air bases they might keep the damage to acceptable proportions – at least so they thought, until the Soviets developed thermonuclear weapons. The true strategic rationale for the initial development of the independent British nuclear deterrent was the fear that the United States' air forces could not be relied upon to give such targets the necessary immediate priority.[20] Before the development of thermonuclear weapons and ballistic missiles, this reasoning made a certain amount of sense, but it was not thought politic to make it public and Slessor, so far as I know, never used it in his public statements. His own arguments were more emotional and, it must be said, less convincing. Britain needed her own deterrent force, he maintained, for one overriding reason; to preserve her status as a Great Power. 'The fact is' he told an Oxford audience in 1954, 'that today a bomber force equipped with the most effective modern weapons is the battle-fleet of the twentieth century and, if we want to remain a Great Power, we must face up to the cost.'[21] In *Strategy for the West* he was even more insistent; 'This thing is so much a matter of life and death to all of us that no British family of the requisite quality should rest content until they have at least one son serving his country in the air.'[22] British pretensions to such Great Power status did not survive the Suez affair of 1956, and thereafter the defenders of Britain's independent nuclear status had to fall back on more practical arguments. Within a few years, in any case, Britain's nuclear status was no longer the concern of the Royal Air Force alone.

One of the last missions that Slessor had to undertake as Chairman of the Chiefs of Staffs Committee was to visit Washington and explain the new British policy to his American colleagues. They gave him a rough ride. In the aftermath of the invasion of South Korea the United States' armed forces had expanded enormously, and they intended to keep it that way.

They did not agree that the Soviets were the cautious, calculating adversary depicted by Slessor, as alarmed by the prospect of a nuclear war as we were ourselves. Instead they expected them to launch an all-out attack on the West as soon as their nuclear weapons were operative, which was expected to be within two years, and the West must be ready to meet them at all points. With NATO pledged to expand on the scale laid out by the Lisbon Goals, the last message they wanted to hear was that their principal ally intended to cut back the forces needed to fight a war and instead rely on nuclear deterrence to prevent one.[23]

Two years later they had changed their minds. Stalin was dead; his successors appeared more accommodating; the war in Korea had been successfully contained and was increasingly unpopular; and Dwight D Eisenhower had been elected President on a policy, not of rolling back the forces of communism, but of restoring peace in Korea and balancing the budget at home. Suddenly the Americans discovered the concept of nuclear deterrence as a solution to their strategic and economic problems over what they called 'the long haul'. This policy, termed 'the New Look' after the latest developments in Parisian *haute couture* was expounded by Eisenhower's Secretary of State, John Foster Dulles, first to his allies in the NATO Council in April 1953, and then to the general public in a famous article in *Foreign Affairs* in January 1954. The object, he there explained, would be to place its military dependence 'primarily on a great capacity to retaliate, instantly, by means and at places of our own choosing, [thereby gaining] . . . more security at less cost.'

In an article that he himself contributed to *Foreign Affairs* a little later in the year Slessor gently pointed out that this was 'not altogether a new concept . . . The so-called 'New Look' is in fact merely a rationalisation of tendencies, themselves originating in economic factors, which it had been increasingly obvious since 1952 would have to be faced sooner or later.' But Dulles was an embarrassing ally. Slessor himself had argued (and was to argue with increasing conviction) that 'The Great Deterrent' had only a limited effectiveness. It had abolished, not war in general, but only 'total war' as it had been waged in the twentieth century. It would deter the Russians, and indeed anyone else, from initiating a major war as an instrument of policy, as Hitler had in 1939, or taking the risk of provoking a major war as the Austrians had in 1914.[24] To that extent, and to that extent only, war had 'abolished itself'. But that only made it more likely that there would be limited wars of the Korean type, and in dealing with

those massive retaliatory nuclear power was irrelevant, if not counter-productive. 'If we place too much reliance on the atomic deterrent for purposes for which it is unsuitable' he told the RUSI in 1954, 'the effect may be exactly the reverse'.[25] 'The Great Deterrent' he told an Oxford audience a year later 'will not absolve us from the unpleasant obligation to be ready to meet limited aggression with appropriate limited force.'[26]

Meanwhile the unveiling of 'the New Look' had set off in the United States a debate that was to continue for decades and drown out the more modest discussions that were carried on in London in such venues as Chatham House, the Military Commentators' Circle, and the newly-founded Institute for Strategic Studies. Increasingly the stage was to be occupied by such prima donnas as Henry Kissinger, Tom Schelling, Bernard Brodie and Albert Wohlstetter, who discussed at an ever more abstruse level the nature of deterrence and the problem of maintaining its credibility in an age of rapid technological change – questions to which British thinkers, include Slessor himself, were to make little further contribution. As the decade wore on, Slessor became increasingly concerned over the nature of those 'limited wars' whose continuance he had always foreseen. How could they be kept limited, and prevented from escalating into the major wars that had, in principal, abolished themselves?

The leading British thinker on this question was a sailor, Rear-Admiral Sir Anthony Buzzard, who had resigned his post as Director of Naval Intelligence largely in order to campaign in public for the views that he had been unable to persuade his superiors to accept when he was in the Admiralty. Buzzard was a rigorous thinker and a committed Christian who regarded the idea of all-out nuclear war as both immoral and counter-productive. While accepting that the West had to prepare for major war in the last resort, he was reluctant to accept, either that we should initiate the use of nuclear weapons or, if they were used, that they should target civilian objectives. He therefore pressed, not only for precise restrictions to be set on the use of force in limited wars of the Korea type, (what Liddell Hart had called 'sub-atomic wars') but that these restraints should be extended even to major hostilities. The use of nuclear weapons, if they had to be used at all, should be initially and explicitly confined to military targets in the battle zone itself. If their use had to be extended, they should still be confined to military targets, but the capacity for such escalation should be kept in reserve to deter the adversary from raising the stakes. If a formal agreement could be reached along these lines, so much the better;

but in any case the West should make its own intentions quite clear in advance.

This doctrine Buzzard termed 'graduated deterrence', and later became known to strategic pundits as 'Intra-war deterrence'. Slessor disagreed, and made his own views clear in a notable debate with Buzzard at Chatham House in November 1955.[27] For one thing, if the Soviets invaded Western Europe, to confine nuclear weapons to the battlefield would be to punish our friends and leave our adversaries Scot free. But more generally, he could not believe 'that, if it comes to major war the hydrogen bomb will not be used sooner or later; and my own feeling is that, ghastly though it would be, it would be less awful for us in the long run if it were used sooner than if it were used later.' In the case of 'limited wars' fought outside Europe, however, he agreed with much of what Buzzard had to say. Unwritten limitations had operated in Korea, where the United Nations refraining from attacking targets north of the Yalu River, and this might work again. He suggested, echoing the thinking of Liddell Hart on the subject, that 'It might suit both sides in a war of this nature to revert to the classical theory and concentrate on the defeat of the enemy's armed forces while limiting, if not entirely excluding, military action against centres of population.'[28] A possible model, he suggested, might indeed be the old RAF doctrine of 'Air Control' used in policing the Empire, when ample notice had been given before bombing to enable non-combatants to get away, and 'prescribed areas' had been designated in which any movement was liable to attack without further warning.

That proved in fact to be a pretty disastrous policy when the United States adopted it in Vietnam with their 'free-fire zones', but another point made by Slessor about limited wars was to be highly relevant to that conflict. One reason why he agreed that it might be unwise to use nuclear weapons in 'Korea-type' conflicts was that the dependence of Western armed forces on ports and bases would make them highly vulnerable to retaliation. In any case, he emphasised, what would be needed for such wars was not sophisticated weaponry but good fighting troops prepared to live as rough as their adversaries. The real weakness of Western armies, he warned, lay in the huge logistical infrastructure made necessary by their heavy weaponry and their high standard of living. 'The organisation of armies', he wrote a shade nostalgically in 1957, 'should be more akin to that of the old Punjab frontier force . . . who went cheerfully to war on foot with a rifle, a couple of bandoliers, a bag of raisins and a chupatti or two,

and a water bottle.'[29] The American forces did not go to war in Vietnam equipped like that. Their adversaries did.

In his later years Slessor became increasingly interested in questions of arms control and disarmament, including a possible disengagement of military forces from Germany – a heretical idea he had first floated as early as 1954 and never wholly abandoned. He observed with some concern the enormous build-up of United States military strength, both nuclear and conventional, introduced by Robert McNamara in the early 1960s in order to provide both forces to fight 'limited wars' and to maintain a nuclear 'second-strike' capability. Like most of his countrymen he remained until the end of his life a strong believer in what became known as 'minimal deterrence'. In a note he wrote in 1963, referring to the McNamara re-armament programme, he accepted that 'We must allow a most generous margin for misjudgement in a situation that has no precedents to guide us. But margin piled up on margins can add up to political, economic and military lunacy. We should never forget in this connection that the primary aim of Western policy is to work towards general comprehensive disarmament which alone can give the world security in the long term.[30] Nuclear deterrence might prevent war but it could not by itself create peace.

Slessor would probably not have expressed himself in these terms ten years earlier when he relinquished the office of Chief of the Air Staff, but not the least admirable of his qualities was his willingness to re-examine and where necessary readjust his ideas with changing circumstances. He was in the habit of describing himself as 'one who is no longer in a position of responsibility but who has had some time to think about these things.'[31] and think he did, hard and long, in a fashion unusual among senior retired officers. Indeed it is hard to think of anyone else who reached his rank and exercised comparable responsibilities, in the British or any other Armed Forces, who made so substantial a contribution to the strategic thinking of his time. There had been brilliant mavericks like Herbert Richmond and J F C Fuller, whose originality had set them at odds with their Services throughout their careers. There had of course been Trenchard, but his grand vision had to be refined and expounded by more articulate acolytes – not the least of whom was Slessor himself. But the very idea of 'Boom' Trenchard engaging, as did Slessor, in long, subtle, good-humoured arguments with his Service colleagues, with his American allies, and, later, with upstart young academics like myself who had never dropped a bomb in anger, boggles the imagination.

I must not conclude this lecture without paying my own personal homage to Jack Slessor. In the mid-fifties some of us founded what was to become the International Institute for Strategic Studies to provide an informed and critical forum to debate the whole issue of deterrence and arms control, and Jack became one of our earliest Council members. He was a regular attender at our seminars, discussions and conferences, and never for a moment tried to pull rank. He always expressed himself with force and precision, but listened courteously to dissenting views, made thoughtful interventions in discussions and, without ever abandoning his principles, allowed himself to be moved along by the arguments. He never made you feel a fool, but if you disagreed with him it was wise first to think through exactly what you were going to say. His was always the voice of experience, realism and sanity, and he kept us all on track. Although he would himself have hotly denied it, he was indeed a truly great man. His contribution to the winning of the war had been outstanding. No less was his contribution to the subsequent keeping of the peace.

Note: *This lecture was presented to The Air League at Chatham House on 11 February 1998, an event attended by several Royal Air Force Historical Society members. We are grateful to Sir Michael Howard for permission to reproduce it herein.*

Notes:

1 Text in Slessor Papers held by Air Historical Branch.

2 Vannevar Bush, *Modern Arms and Free Men* (New York, Simon and Schuster 1949) pp115-116. Emphasis added.

3 Reprinted in Sir John Slessor, *The Great Deterrent* (London, Cassell 1957) p72. (hereafter *GD*).

4 Bernard Brodie, *The Absolute Weapon* (New York, Harcourt Brace, 1946) p89.

5 B H Liddell Hart, *The Revolution in Warfare* (London, Faber 1946) p87.

6 Notes for discussion with US Joint Chiefs of Staff 29/30 July 1952, in Slessor Papers, AHB, Air 75/20.

7 An account of the Greenwich meeting and its significance is to be found in John Baylis *Ambiguity and Deterrence: British Nuclear Strategy 1945-54* (Oxford, Clarendon Press 1995) pp126 ff.

8 Text in Slessor Papers, AHB, AIR 75/20.

9 Sir John Slessor, *Strategy for the West* (London, Cassell 1954). Hereafter *SW*.

10 *SW* p2.

11 *SW* p27.

12 *SW* p5.

13 *SW* p21.

[14] *SW* p49.
[15] *SW* p64.
[16] *SW* p7.
[17] *SW ibid*.
[18] *SW* p108.
[19] *SW* p5.
[20] On this see Ian Clark & Nicholas J Wheeler, *The British Origins of Nuclear Strategy, 1945-1955* (Oxford, Clarendon Press 1989) passim.
[21] *GD* p89.
[22] *SW* p105.
[23] See n.6 above.
[24] *GD* p181.
[25] *GD* p144.
[26] *GD* p182.
[27] International Affairs, April 1956, pp148 ff.
[28] *GD* p246.
[29] *GD* p310.
[30] 'NATO Nuclear Strategy: some lessons from History' in Slessor Papers, AHB.
[31] *GD* p217.

THE AIR LEAGUE GOLD MEDAL

On 11 February 1998, the President of the Air League, Lord Tebbit, presented a Gold Medal to the Royal Air Force Historical Society for the latter's outstanding service to the aims of the League. The Air League's Council had taken the view that the Society's achievements over its first decade had been a resounding success and had much strengthened the understanding and record of the development of air power in the United Kingdom. The Gold Medal was accepted, on behalf of the Society, by our President, Marshal of the Royal Air Force Sir Michael Beetham, in the presence of a distinguished audience that had gathered at Chatham House to hear the 1998 Slessor Air Power Lecture given later that evening by Professor Sir Michael Howard.

Longer serving members may recall that the Society held its first meeting on 20 October 1986 when Professor R V Jones lectured on 'The Intelligence War and the Royal Air Force'. The concept of an RAF Historical Society had been put forward by Air Marshal Sir Frederick Sowrey in the late 1970s but was not taken up. However, with the help of the then Head of the Air Historical Branch – Air Commodore Henry Probert – it was relaunched early in 1986 by a letter to the *Times* and *Daily Telegraph* from the late Marshal of the Royal Air Force Sir Dermot Boyle on behalf of the sponsors listed opposite. Air Marshal Sowrey became the founder Chairman for 10 years.

As a mark of our respect for his achievement leading the Society to its present position, the present Committee decided unanimously that Sir Freddie should be the first recipient of the Air League Gold Medal. Our President, Sir Michael Beetham, presented it to him at the Annual General Meeting at the Royal Air Force Club on 23 June 1998.

We envisage presenting the medal to worthy recipients every few years or so. Meanwhile, suitably engraved, it will shortly be displayed in a cabinet at the Royal Air Force Club at 128 Piccadilly.

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MARSHAL OF THE ROYAL AIR FORCE SIR JOHN SLESSOR GCB DSO MC

This short biography is a condensed version of that written by Air Commodore Henry Probert and published in his ***High Commanders of the Royal Air Force*** *in 1991.*

Born in India in 1897 and educated at Haileybury, Jack Slessor – as most people knew him – had suffered from polio as a boy and having been rejected by the Army in 1915 talked himself into the Royal Flying Corps. He learnt to fly at Brooklands, served briefly with No 23 Squadron at Suttons Farm, where he undertook his first operational sortie in a vain attempt to destroy a Zeppelin, and then joined No 17 Squadron, with which he flew against the Turks in Sinai and also in the Darfur operations in Sudan, where he was awarded the MC, wounded and invalided home. Later in the war he saw active service in France with Nos 58 and 5 Squadrons.

Having briefly left the RAF in 1919 he was soon back, and while at No 1 Flying Training School in 1920 he took part in the first Hendon Air Display. He then joined No 20 Squadron on the North West Frontier, where he was unimpressed by the Army's administrative support for the RAF's operations. Back home in 1923 he served first in the Air Ministry in the Staff Duties Branch, then attended the RAF Staff College, and in 1925 took command of No 4 (Army Co-operation) Squadron at Farnborough. Two of the main threads in his career were thus already apparent: land/air warfare and high-level staff work, and from 1928-30 he worked directly under CAS in the Directorate of Operations and Intelligence. Thus began a lasting association with Trenchard, who regarded him highly and used him as a ghost writer for many of his speeches, articles and letters to the press until well into the wartime years.

His career now switched back to the Army, with whom he spent the next four years as RAF member of the Directing Staff at Camberley. Here he formed many friendships which would later be invaluable and developed a reputation for clear thinking and writing exemplified in his influential book *Air Power and Armies* published in 1936. There followed a posting back to India, where he put into practice his ideas on land/air warfare in command of No 3 (Indian) Wing during the Kaisora operations in Waziristan. Meanwhile in 1935, soon after his arrival, he had been fortunate to survive the Quetta earthquake, having had to be rescued from the ruins of his residence.

Having returned home in 1937 he was never again far from the centre of events. For the last years of peace, he worked first as Deputy and then Director of Plans, and he remained there until late 1940 – working both for CAS on the development of RAF policy and for the Chiefs of Staff as Air Member of the Joint Planning Committee. These were years when, as he put it, 'the sense of urgency was crowding in' and, to echo John Terraine, the forthright language he used on many occasions cannot fail to impress. His anxieties about the rate of production of new aircraft and the RAF's many weaknesses, especially in its striking power relative to the *Luftwaffe*, were repeatedly stated, and he could not conceive going to war at the time of Munich; Slessor was ever the realist. In early 1939 he took part in the formal staff conversations with the French and in later discussions on how their air forces should be employed. Then after Dunkirk he and other British planners began at Churchill's behest to consider the strategy should France collapse and in July produced their future strategy appreciation, realistically setting out how the war should be prosecuted now that Britain and the Commonwealth stood alone.

Then, given the importance of American aid, Slessor was sent to Washington to explain the RAF's plans and needs, and to negotiate for the supply of aircraft. He remained for the first full staff conversations about the strategy should the USA enter the conflict and as Portal's representative helped ensure a wide measure of agreement. By the time he returned home in April 1941 he was known to, and respected by, many of the American leaders, political as well as military.

It was time now for an operational post, and as a convinced 'bomber man' Slessor was appointed AOC 5 Group; he stayed there only until March 1942, over a period when Bomber Command was still learning lessons the hard way, before being recalled to the Air Ministry to become Assistant Chief of Air Staff (Policy). The extension of the war to involve Russia, Japan and the USA was posing even greater planning problems and his wide experience, coupled with his knowledge of the Americans, made him the ideal choice. Among the host of issues confronting him were disputes with the other Services over their air support, the allocation of American aircraft between British needs and theirs, the bombing policy to be followed by the USAAF, and the overall Anglo-American strategy; when this was considered at the Casablanca Conference Slessor's drafting for Portal did much to reconcile the differing views.

He next had the chance to help implement that strategy. Crucial to the

1943 campaign in the Mediterranean and to Operation OVERLORD in 1944 was the defeat of the U-boat in the North Atlantic and when Slessor took over Coastal Command in 1943 that battle was far from won. Fortunately many of the techniques of naval/air warfare had at last been learnt and the long-range aircraft needed to cover the mid-ocean gap were becoming available, and his experience with the Navy and the Americans did much to improve the co-operation between the sea and air forces on each side of the Atlantic. The great turning point in the Battle came in May, when shipping losses fell dramatically, and from then on – though Coastal Command could never relax – the U-boats were held on the defensive.

After just a year at Northwood, Slessor was appointed in January 1944 to relieve Tedder as the RAF CinC in the Mediterranean and Middle East, where he became deputy to his friend General Eaker as Allied CinC. While his purely RAF responsibilities extended right across the Middle East, much of his attention was devoted to the Italian campaign, where the maintenance of virtual air supremacy enabled the air forces to concentrate largely on the various forms of army support. He also set up the Balkan Air Force to co-ordinate air operations in support of Tito's partisan army in Yugoslavia, and his role in the Warsaw Rising in the summer of 1944 left a deep impression. 'The worst six weeks in my experience' was how he described the supply-dropping missions from Italy which, against all his military judgement, he was for political reasons compelled to order. The cold treachery of the Russians in Poland would condition his thinking for the rest of his days.

Slessor returned home in March 1945 to a different challenge: he was now to join the Air Council as Air Member for Personnel. Here he had to reduce the strength of the RAF from its wartime level, which entailed releasing some 700,000 airmen and airwomen to civilian life, and at the same time rebuild the personnel structure to fit the needs of the peacetime air force while coping with a well-nigh desperate recruiting situation. As might be expected, his interests also ranged much more widely; as Sir James Barnes, the Permanent Under Secretary, said on Slessor's departure in October 1947, 'He has made his mark on every aspect of the Council's work. His wide knowledge of the Air Force and the other Services, and his outstanding energy have not only been addressed to the work of his own Department but freely and unselfishly placed at the disposal of his colleagues in dealing with difficulties that were not strictly his own.' This enthusiasm for involving himself in all the issues of the day continued

during the next two years when, as Commandant of the Imperial Defence College, he was frequently consulted by Tedder and by others in high places. The freedom from day-to-day routine responsibilities which he saw as one of the IDC's greatest benefits, and which he was so keen to preserve, gave him personally the opportunity to think deeply about the strategic problems of the post-war world and the roles of air power in the nuclear age – a good preparation for his final RAF posting.

Sir John Slessor became CAS on 1 January 1950, and his three years in post were dominated by the Korean war and its repercussions. When South Korea was invaded in June 1950 he was reminded of the Munich crisis, when Britain's defences had seemed just as inadequate, and he immediately asked his staff to consider how the RAF's capacity could be improved should the financial constraints be lifted. He also gave his Chiefs of Staff colleagues a strong lead in insisting that the Soviet threat in the west remained paramount; every effort was now being made to establish the NATO military structure and build up its forces and Korea must not be allowed to weaken that position. The RAF in particular, with key roles in Western Europe and already deeply committed in the Malayan Emergency could not possibly play a significant part in Korea but Slessor himself played an important role, particularly when the Chinese Air Force joined in the war from Manchuria and General MacArthur demanded permission to attack their bases. In the view of the British Government this would cause a dangerous escalation of the war, and in January 1951 the Cabinet chose Slessor to go to Washington to explain to the American leaders Britain's anxieties about the military situation and the dangers to Anglo-American solidarity. In the event the war was contained and if the United Kingdom exercised a restraining influence, as it almost certainly did, then Slessor deserves his share of credit.

Nevertheless, the possibility of war with the Soviet Union in the next few years still loomed large, and much of his time as CAS was devoted to strengthening the RAF under the major re-armament programme instituted by the Attlee Government. While the development of the new advanced aircraft such as the V-bombers was pressed forward, the urgent need was for many more aircraft in the short term; the Washington and Sabre supplied by the USA filled the immediate gap, and a force of over 600 Canberras was ordered. A host of other issues also engaged his attention, such as the expansion of flying training, flying accident rates, the restoration of the UK control and reporting system, the deployment of the

USAF on British bases, the LAA defence of overseas airfields, air support for the Army, the re-equipment of the transport force, the introduction of the first helicopters, and, not least, the first British atomic tests.

Slessor handed over the reins at the end of 1952 and thereafter devoted much of his time until his death in 1979 to writing and the defence debate. *The Central Blue*, which appeared in 1956, still stands as the best book written by a former CAS, and by speaking at conferences, being interviewed on the radio, and writing a multitude of papers, articles and letters to the Press, he constantly sought to influence opinion at home and abroad on air power and wider defence issues. He deserves recognition as one of the great thinkers about air strategy and as one of the RAF's most able operational commanders. Above all his staff skills and the ability to get on with leaders at the highest level proved their worth both in wartime and in dealing with the special challenges that faced him as Chief of the Air Staff.

CORRESPONDENCE

From Anthony Furse, Mold, Flintshire.

Dr Dixon's letter, Journal 18, leaves too much unsaid. Despite his considerable ability, Dowding was a most uncongenial character, supremely conscious of his own rectitude and doggedly determined to blame each check to his ambitions on others.

There is no doubt that Trenchard and Salmond – and their successors, Ellington and Newall – knew his strengths and weaknesses; but, nevertheless, despite these flaws, they had given him appointments and Air Council posts of great responsibility, making him AMSR in 1930, AMRD in 1935 and CinC Fighter Command in 1936.

Disappointed in his hopes of succeeding Ellington as CAS in 1937, he subsequently yielded to the temptation to treat each subsequent decision on his appointments – even during the Battle of Britain – with surly comments, and obviously tried to enlist the help and support of Churchill and Beaverbrook over the heads of his Service chiefs and the Air Minister. Comments by Churchill to Sinclair in July 1940 give the impression that he might later insist on imposing Dowding as CAS on the Air Council.

Matters came to a head in September, over night fighter operations, and there seems little doubt that Dowding's almost contemptuous rejection of

most of the advice given to him by the Air Council and some very 'high powered' committees, further alienated his senior colleagues.

Dowding was forced to accept many of their recommendations, and his hope of becoming CAS after Newall was ended by the appointment of Portal.

After leaving Fighter Command, Dowding's visit to America was a PR disaster; he told the Americans that there was no point in mass producing night bombers since an effective defence would soon follow as had happened with day bombers; they should start mass producing tanks. He was promptly recalled.

Various other appointments were suggested by Churchill, and vetoed by Portal and Sinclair, and when, eventually, he agreed to review manpower policy for the RAF, he soon fell out with Freeman, the VCAS. They disagreed on some matter, and Dowding made the mistake of complaining to Churchill over the heads of his Service, that this 'was gratuitous impertinence from an officer junior to myself'; his subsequent retirement was a great relief to the Air Council.

From Wg Cdr M J Gilbert, Much Hadham, Herts
Journal 18: Book Review, page 120-1

A E F R in his review of *Tail Gunner* expresses amazement at reading of 'cans of beer being drunk in the mess.' 'I cannot remember canned beer in the war,' etc.

Although I cannot speak from personal experience – being an only just pre-war baby – memoirs of the war years do refer to 'cans', clearly a slang term deriving from tankards, not beer cans. As an example see *Enemy Coast Ahead* by Guy Gibson VC, Pan edition of 1971. 'The first thing I saw when I went into the Mess was a look of surprise on the boys' faces as they drank their cans of beer.'

From Professor Robin Higham, 2961 Nevada Street, Manhattan, KS 66502-2355

In 1991, Journal 10, pages 75-78, I called attention to the lack of RAF documentation. I am happy to say that I have now been able to fill that gap by the numbers, but not the documents.

AIR 10/1860 *Manual of Administration for the Royal Air Force* (October 1939 revised edition of June 1932) is salted with references to Forms and *KR (Air).* Best of all at the back it gives the Adjutant's diary, a list of relevant air publications, and schedules of inspections (including the monthly unpaid officers' mess bills).

It seems that it is much harder to obtain such important items as ORBs for Equipment Officers or AP830 Vols I-III, governing allowances and issues.

Booksellers tell me that APs rarely came on the market. Some may be at the RAF Museum and some at the PRO. Whether the same applies to AM pamphlets I do not yet know. But for my work in progress on the RAF – the years 1931-41 these could be useful as indicating the mindset of the authorities.

By the way, one of the inspections to be made on units was of maps and charts. Records of these in Bomber Command would be of interest, as Bomber Command was limited in 1939 to striking only NE France and Belgium for lack of maps.

Editorial Note: *Any correspondence on the above should please be sent direct to Professor Higham.*

Referring to Journal 18 Page 99, John Price's unanswered question at the Aden Seminar about the mysterious transport aircraft. The event is said to have occurred in February/March 1964 and the aircraft was an Il-14 operated by the Egyptian Air Force. After being intercepted by two Hunters it landed at Khormaksar where initially it was parked between No 37 Squadron's hangar and the swimming pool.

We thank two members, David Andrews and Ray Deacon, for writing in about this incident.